The Mortlach Site in the Besant Valley of Central Saskatchewan

By

BOYD N. WETTLAUFER
Provincial Archaeologist

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Soils Report Physical Features and Soils of the Mortlach Archaeological Area

By

HAROLD C. MOSS

DEPARTMENT OF NATURAL RESOURCES
Regina, Saskatchewan

ANTHROPOLOGICAL SERIES No. 1 1955

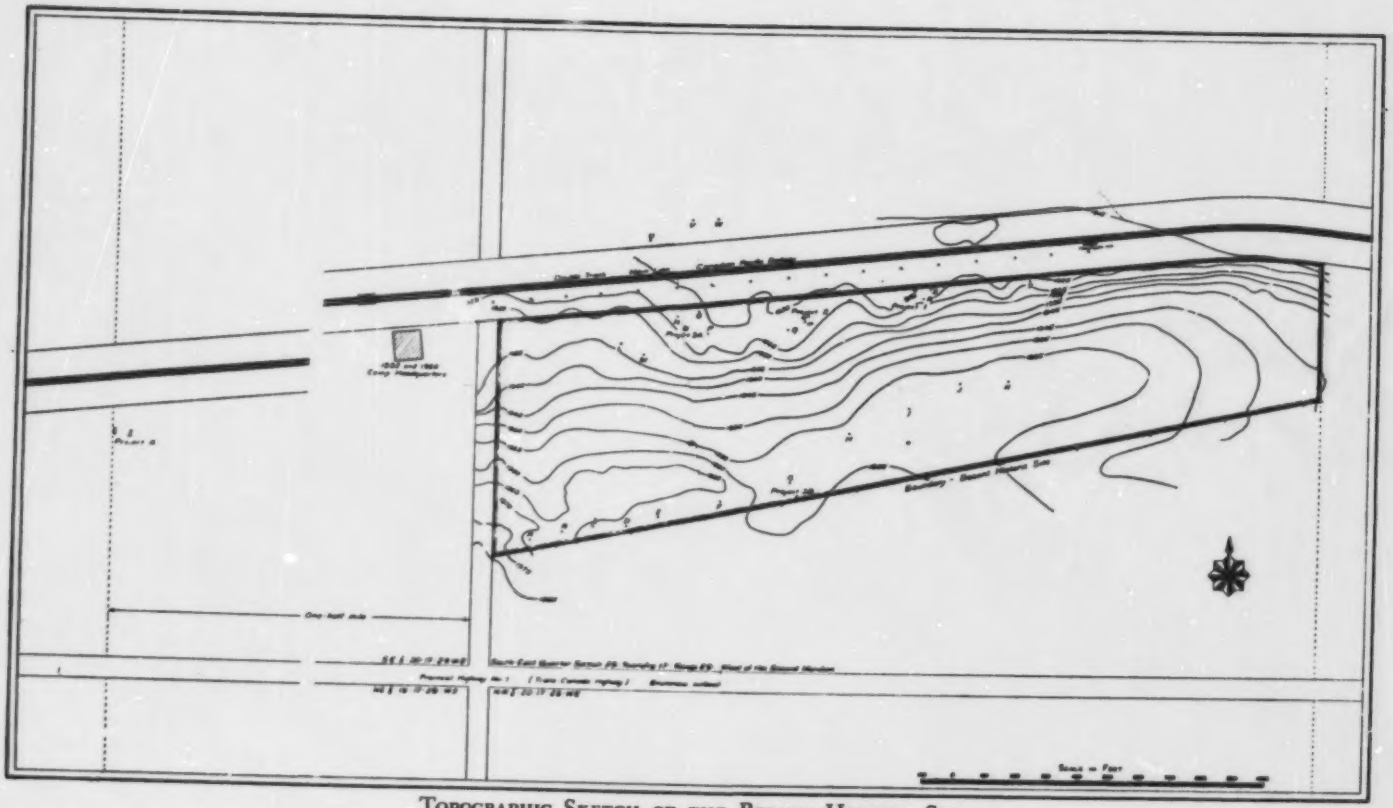
Published by

THE SASKATCHEWAN GOLDEN JUBILEE

COMMITTEE

REGINA, SASKATCHEWAN:
Printed by LAWRENCE AMON, Printer to the Queen's Most Excellent Majesty
1956.

Cover by ALFRED DAVEY



TOPOGRAPHIC SKETCH OF THE BESANT HISTORIC SITE

REGINA, Saskatchewan,
October 31, 1955.

THE HONOURABLE J. H. BROCKELBANK,
Minister of Natural Resources and Mineral Resources,
Administration Building,
Regina, Saskatchewan.

SIR:

I have the honour to present, the first Archaeological Report in the Province of Saskatchewan and the first in an anthropological series for the Department of Natural Resources.

During the summer of 1954 the Department of Natural Resources, with assistance from the Department of Mineral Resources and the Saskatchewan Research Council, undertook the first *major* archaeological excavation in the three prairie provinces. This undertaking included a full scale camp establishment; laboratory tent and equipment; dormitory tents; a complete field cook tent and even included the sinking of a well to insure a good supply of fresh water. The camp operated from June 15 to October 1. A permanent crew was hired, which included students from the universities of Saskatchewan and Kansas.

The site excavated, one with considerable antiquity, was located in the Besant Valley four miles east of Mortlach, Saskatchewan. In spite of adverse weather conditions the excavation was a decided success. Thirteen levels of occupation were established and are reported on in the body of this publication. The Mortlach site is one unique in the history of the Great Plains. It spans a time period from a few hundred years ago back to approximately 1500 B.C. The preservation of this time calendar is phenomenal. The evidences of the habitation of group after group of Saskatchewan's early inhabitants has been carefully buried in this valley awaiting the trowel of the archaeologist. Few archaeological sites span so much history, and it is a rare find indeed to encounter one which gives us information on so many people over so long a period of time.

Much of 1955 has been spent in laboratory study of the specimens obtained in the archaeological excavation. The following publication is the result of this study. It constitutes not only the work of my crew and myself, but the combined effort of the Chemistry and Soil departments of the University of Saskatchewan, the History and Geology departments of this same institution, numerous administrators of both the Department of Natural Resources and Mineral Resources, draughtsmen and stenographers of both departments, and the photo services of the government, members of the Golden Jubilee Committee and Historical Sites Sub-committee, members of the Saskatchewan Research Council, the Bureau of Publications, the Provincial Archivist, the Provincial Librarian, and many more whose connection is more indirect. To all of them, my thanks for their participation.

This, the first archaeological excavation in Saskatchewan, is now history. It is also a ladder with rungs as strong and secure as scientific research can make them. The archaeological potentialities of Saskatchewan are great, as great as any province in Canada or state in the United States. It remains for the province to use this ladder as a basis for further progress in the reconstruction of the prehistory of Saskatchewan.

I thank you, sir, for the opportunity of presenting this pioneer work.

BOYD WETTLAUFER,
Provincial Archaeologist.

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PREFACE

The 1954 excavation in Mortlach was the first major archaeological excavation in Saskatchewan. It was undertaken by the Department of Natural Resources and the Department of Mineral Resources of the Province of Saskatchewan, with a grant from the Saskatchewan Research Council of the University of Saskatchewan. The author was in charge of the excavation and wishes wholeheartedly to thank the members of the above organizations for sponsoring and supporting this scientific project.

Nothing of importance could have been accomplished without the able assistance of the crew: Mr. Alfred Johnson of Ellsworth, Kansas, field assistant; Miss Shirley Lyon of Fredonia, Kansas, in charge of the field laboratory; Mr. Rudy Radons and Miss Nancy Hockley, enthusiastic and capable students of the University of Saskatchewan; Mr. Allan Hudson of Mortlach, Saskatchewan, who added much to the project with his careful work and sage wisdom; Mrs. Mary Miller of Mortlach, Saskatchewan, the cook of the expedition; and lastly, my wife Dorothy, laboratory assistant, whose constant demand for an explanation kept everyone on their toes.

May I also express my appreciation for the work of Mr. Harold C. Moss, Department of Agriculture, University of Saskatchewan, for his chapter on soils and for his very careful laboratory study of soil samples taken from the excavation; and to Dr. K. J. McCallum for running carbon tests on samples derived from some of our levels. My appreciation to the members of the Historic Sites Sub-committee of the Saskatchewan Golden Jubilee Committee for their influential support. Thanks also to Mrs. Muriel Clements of the Saskatchewan Golden Jubilee Committee for her time and effort spent in editing and reviewing this report.

My sincere thanks to Mrs. Jack Herbert, who cheerfully and unselfishly donated a month of her time and effort to the cause. Mr. Johan Toews deserves more than casual recognition for his excellent drafting of the stratigraphic cross-sections and for spending his leave drafting at the excavation. Thanks also to Mr. A. Bereskin and crew for surveying the site for us, and my heartfelt thanks and appreciation to the Saskatchewan people for their great interest in our project, shown by their letters and phone calls, and by the fact that more than a thousand people took the time and trouble to visit our archaeological camp during the summer.

May I take this opportunity to express the hope that this widespread interest continues, and to invite anyone who may hear of our future work to consider themselves most welcome to visit us at any time.

An attempt will be made in the following pages to separate the material found in this stratified site into definite cultural levels through careful study. This material will consist of the results of the 1952 and 1954 excavations by the Saskatchewan Government. Comparisons will be drawn, where possible, with similar cultures of north-central United States.

INTRODUCTION

A small spring-fed creek locally known as Sandy Creek, flows through the Besant Valley. This creek has its origin near the base of the high bluffs south of Mortlach, Saskatchewan. The valley proper begins three miles east of Mortlach where the creek cuts through a series of rolling sand hills on its way to join the Thunder Creek drainage system near Caron, Saskatchewan. This creek is a meandering stream and carries with it much sand, especially during flood periods. It has changed its course many times as evidenced by a careful study of aerial photographs of the region (see frontispiece). During wet periods it has helped cover the valley floor with sand and silt. During dry periods, the adjacent sand dunes have contributed their substance to the ever increasing sedimentary fill of the stream valley. Scattered along the valley bottom for several miles are tools and other evidences of Indian occupation throughout the ages. The valley, with its abundance of fresh water and game, made an admirable camping area for nomadic peoples following the migratory movements of bison and caribou herds. Between periods of camping, the stream contrived to bury the evidence of these nomadic visitors under inches of sedimentary deposits until the earliest of these prehistoric camps was over nine feet below the surface of the present ground level. The resultant stratified deposit was the reason for the excavation and constitutes the major bulk of the evidence presented in this report.

Naturally, all the people did not camp in exactly the same place and it was necessary for us to conduct periodic excavations along the valley bottom for more than a mile in order to obtain enough material from each of the various levels of occupation to reconstruct a picture of the culture belonging to each of the numerous inhabitants. At the extreme western end of the camping area we found a buffalo jump or kill in the shadow of the south bank. This kill was so recent that quantities of buffalo hair and the outside casing of the horns were still undestroyed by time. It was in this region in 1948, that Mr. M. McLean of Mortlach first stumbled upon evidence of Indian occupation. This area has been the scene of much of the amateur digging. We were therefore forced to content ourselves with a small cross-section of the undisturbed remnants. This in itself proved relatively unimportant since this later occupation is represented by a thin upper level in the central and eastern portions of the site. The distribution of material along the valley bottom gave us a distribution in time running from east to west. The earliest and deepest deposits were encountered at the eastern end of the camping area. As we moved westward to the central part of the site we lost these early deposits, and the cultural material of the middle levels became more abundant. The western extreme, already mentioned, showed no evidence of anything but late occupation. The site is located on the southwest quarter of section 29 and the southeast quarter of section 30, township 17, range 29, west of the second meridian. A portion of the site was set aside early in 1954, as an historical site of the Province of Saskatchewan by Mr. Jack Herbert, director of Historic Sites, Department of Natural Resources. It has been fenced and is subject to the laws and penalties of *The Historic Sites Act.*

Amateur excavations have been made throughout the entire length of the camping area. Test excavations were made by the author and staff of the Provincial Museum during the summers of 1951 and 1952. These excavations together with that of 1954 yielded better than 1,000 artifacts in situ. Great

care was taken to record carefully the exact conditions of the discovery of each artifact. Careful cross-sectional drawings were made of all four sides of each individual excavation and many photos were taken of material in situ, stratification, features, etc., a few of which appear in this report. Field laboratory work was conducted on a day-by-day basis keeping abreast of the excavation program, and many auger test holes were made before a new project was set up for excavation. The author is firmly convinced that the areas excavated are a fair representation of the available material. Much additional information could be obtained by complete excavation of the site, but it is doubtful if the returns from further excavation would justify the expenditure. A scaled drawing of the area excavated appears as the frontispiece and will be referred to from time to time. Copies of the additional photographs and cross-sections can be made available to any serious student in the field of archaeology who wishes to check the conclusions of this paper.

Part I

THE EXCAVATION

Camp was set up June 15, 1954, and for the first five days the crew drilled test holes with a hand auger. This was necessary to establish the best location for excavation. After numerous attempts it became obvious that no deep deposits were to be found except in the near vicinity of Project 1 of the 1952 test excavations. Evidence of the lowest cultural level encountered in this test excavation could be found in an area restricted to a strip running east and west approximately sixty feet long and forty feet wide, including the 1952 test area. Evidence of similar soil levels were found farther east but the stratigraphy was considerably thickened toward the east. The one small area where a thin layer of bone occurred at the lower level overlying the clay, gave a depth of fifteen feet from the surface compared to the same level which was encountered at nine feet in the 1952 test. Neither the soil level nor the lower cultural layer was encountered in the central or western part of the site (see frontispiece). Water had forced the abandonment of the 1952 test at nine feet and water was encountered through the valley at just over six feet in the auger tests. Thus, the fifteen foot deposit was out of the question.

ILLUSTRATION 1
Hand Drilling Test Holes in the Deepest Part of the Valley

Possibly this would be a good time to point out that the excavation was arranged in April, whe weather conditions indicated a particularly dry summer. Heavy May and June rains made excavation hazardous at best and the excavation would have been changed to another site if it had been possible to so arrange funds. Hope was expressed that the rains would soon stop and with this hope in mind excavation was started. In spite of our wishes the rains continued with very little fine weather through September when the site was finally abandoned. Water was a constant problem. We fought it all summer long. Not only a high water table but one augmented by beaver dams. These persistent engineers kept the crew busy cutting and destroying their structures to gain a little reprieve from the threat of flood. By desperate effort a portion of the lower level was excavated the last few days of August. Even so, the northern portion of the excavation never did reach the lower levels, as the steep dip of the soil horizons (beds) made it unfeasible. At the close of the excavation two feet of water stood in the trenches and part of the cook tent was awash due to flooding by the beaver. It is doubtful if the lower levels of occupation of this site will ever again be excavateable. Future work will be hampered by the same hazards we encountered as well as a higher table when the City of Moose Jaw ceases to use this stream for its water supply and converts to Buffalo Lake water system.

ILLUSTRATION 2

Clearing the Surface of Project 1C

Left to right: Rudy Radons, Nancy Hockley, Shirley Lyon, Alfred Johnson, Allan Hudson, and Dorothy Wettlaufer.

An area consisting of four five-foot squares was laid out west of the 1952 test area and two five-foot squares eight feet east of the southeast corner of the 1952 area (see Figure 7). These squares were laid out on a magnetic north and south bearing and were numbered after the cardinal positions from a central *datum* stake; i.e., *datum* was called "O," stake five feet east of it was called E_1, the stake five feet north of O was called N_1. Since the 1952 excavation had been called Project 1A, the area to the east will be called Project 1B, and to the west Project 1C.

Contour maps were drawn of the surfaces of the two projects from the corner stakes having the highest elevations. All vertical measurements were then related to these contours to give true depths below the surface. Cultural material was encountered in the grass roots, so excavation was started with trowels and whisk brooms. Although other methods of excavation were considered from time to time, the complex stratigraphy and the persistence of the cultural material prevented any change in methods, and the whole of Project 1 was excavated to nine feet in this meticulous manner.

The complexity of the stratigraphy was such that it was considered necessary to call in a competent soil scientist to run tests on the various levels. Mr. Harold C. Moss, agreed to visit us in September and to take samples for study. The results of his work are given in the chapter on soils bearing his name. For the benefit of the reader and for continuity, stratigraphic cross-sections and other sketches representative of this excavation will be given, where possible, in the immediate area in which the soils study was conducted. This should give the reader a very good opportunity to establish the stratigraphic sequence for himself. This is particularly true as the area in question was the one location were all stratigraphic levels were present.

Our problems with the water table resulted in much moving around during the season. Realizing the need to establish the water level before cutting through it, a new square was set out in Project 1B, July 1. This square E_1N_3 (see Figure 7) was carried down to the water level by July 15. Since this square was ten feet downhill from the rest of the excavation a barrel was sunk in the sandy bottom and a pumping system set up in an effort to lower the water table locally and thus permit further excavation of the lower levels. On July 19 Project 1B was dangerously close to the water table and so was temporarily abandoned. Project 1C was continued, however, as it was higher on the valley slope and not yet showing traces of water. A new part of Project 1B was laid out—two five-foot squares E_1N_4 (see Figure 7). Although these squares were in the valley flat with no possible hope of reaching the lower levels, the excavation of E_1N_3 suggested a heavier concentration of upper level culture than in Projects 1C or 1B. Happily, this proved to be correct and much of our material from the upper levels came from these squares.

On July 27, Project 2 was set up (see Figure 5). This was located in the valley flat on a low plateau in the curve of an old meander of Sandy Creek. This was a camping area, adjacent to the stream, when the stream flowed on the south side of the valley instead of on the north side as it does today. Squares W_1 and W_2 were excavated from the surface down with trowel and whisk broom. The area proved to be one of fairly simple stratigraphy so it was possible to carry out the rest of the excavation in three-inch levels. Features such as fire-pits and cache pits were excavated by trowel and associated material measured in with accuracy. Profiles were drawn. Careful laboratory work made possible the correlations shown in the sketch.

At first an attempt was made to classify the cultural levels of the Mortlach site according to McKerns classification. This resulted in many unknowns due for the most part to lack of excavation in the northern plains which could be accurately linked to the various cultural levels of this site. Part way through this report it became obvious that some more satisfactory way of designating cultures must be devised. So, it was finally decided to simply call these levels "cultures"; the Mortlach culture, the Moose Jaw culture, etc. Culture would be defined in this case as a complex of tools sufficiently different from the cultural complex above and beneath it to be considered the work of a different people. No attempt was made to name sub-cultures until further work can be done in the area. These were simply referred to as occupations of a particular culture and in this report may number as many as four. These occupations are cultural levels having marked similarity to each other or insufficient differences to set them aside as a separate culture.

In the meantime work had to be abandoned on Project 1C which was nearing the water table. Profiles were drawn and some difficulty was encountered correlating the profiles of the 1952 (Project 1A) test area with those of Project 1B and 1C. After some discussion it was decided to remove the fill from Project 1A and see if the profiles could be linked. This was completed on August 3. However, the nearness of the water table and other factors had combined to weaken the separating wall between Project 1A and 1C and during the night of August 3 it fell, along with a part of square N_2. Little could be done to salvage this portion and the debris was cleaned up and a few artifacts salvaged but these proved of little value due to the lack of stratigraphic evidence. Profiles were then drawn tying Project 1A and 1C together, and the crew moved over to the central area of the site to work on Project 3 (see Figure 2). This area was where Mr. Hudson did most of his excavating and from tests in 1951 and 1952 showed promise in the upper and middle levels. Four five-foot squares were excavated to the yellow sand. The test auger showed no evidence of occupation below this level. This whole project was excavated meticulously with trowels and whisks, and portions of several vessels were reconstructed from associated fragments of pottery in the upper levels. The upper levels of this area were easily linked with Projects 1 and 2, and supplied much of our data for pottery types.

About this period of time, work was again possible on Project 1. The beaver dams had been dynamited and a lull in the rains was encouraging. The area lying between Project 1B and 1A was removed (see Figure 7). A large tree grew in this area and necessitated much labour on the part of the crew. The root system had disturbed much of the upper level stratigraphy, but some excellent material was located in the lower levels of occupation. The whole area, thirty feet by ten feet, running east and west from the eastern edge of Project 1B to the extreme western edge of Project 1C, was now excavated to the sandy layer overlying the lowest cultural level (marked seventh level in Figure 6). Water came in constantly, but a part of the crew was put to work bailing, and the last few days of active excavation were spent in removing as much material as possible from the lowest level. As stated before, only a portion of the extreme southern side could be removed, as the northern edge dipped steeply under the water table.

Some cultural material was appearing in the sand layer above this lowest culture, so no excavation could be carried out under water for fear of mixing the cultural material. The sand walls would not stand when saturated with water, so Project 1 and the deep level were finally abandoned. In the

meantime, Project 4 had been set out in the extreme western end of the camp area. This was a very shallow deposit, and on laboratory test seemed to consist of two occupations of the same people—possibly a spring and fall hunt, or at most, several seasons apart. The pottery from this area was quite different from the rest, and represented the latest occupation of the valley. Seven five-foot squares were excavated in three-inch levels to a depth of one foot, the materials all coming from the top nine inches. Profiles were drawn and the cultural material will be dealt with later in this paper.

This chapter has been placed in here to give the reader a background to the rest of the paper. From here on we will deal with the cultures and their interpretations.

THE MORTLACH CULTURE

This is the latest prehistoric occupation of the Sandy Creek Valley. It is represented by a cultural deposit at the extreme western end of the valley. This shows a separation into two occupations of the same people, indicated by a thin drift sand zone between the upper grass roots culture and the lower occupation. This sand zone varies in depth from three inches to five inches below the surface, and is seldom over one-half inch in thickness. In some parts

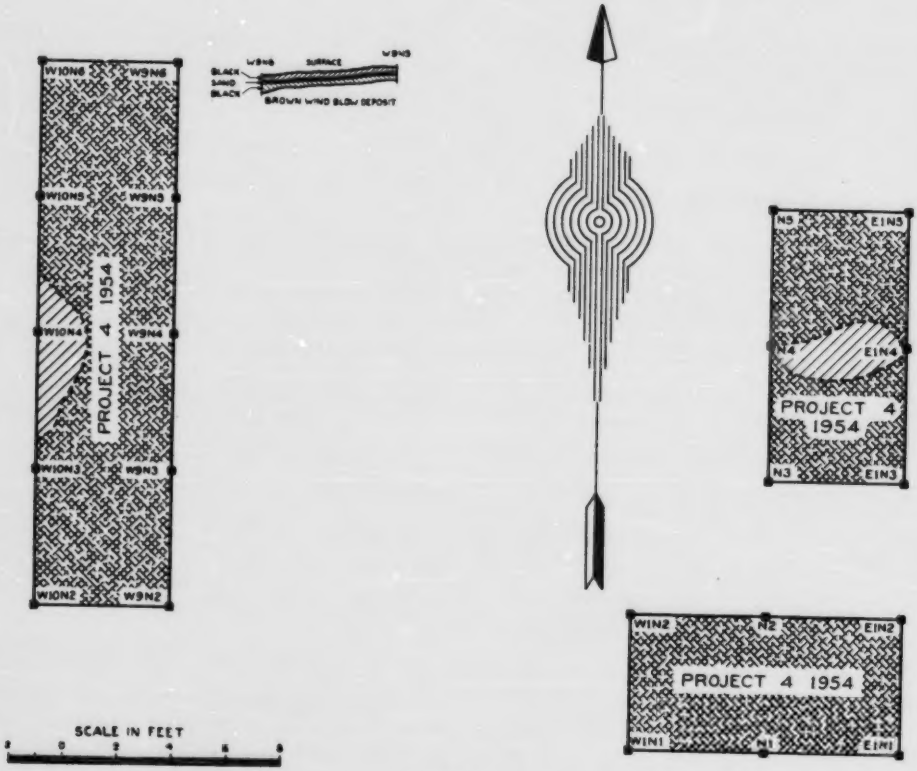


FIGURE 1
Project No. 4—Mortlach Culture

of the excavation it disappears altogether. Thus, the two occupations of the site were at most a few seasons apart. The area tested was one worked over very thoroughly by the amateur archaeologists. It is the camp area from a bison kill approximately one hundred yards southwest of the site under the south bank of the creek valley. Here great quantities of bones, with masses of bison hair, had been dug out. No undisturbed area of the kill could be found to excavate. Test auger holes carried the cultural material from the kill to the flats, where quantities of pottery and fired stone indicated the presence of the main camp area. Material was excavated in this camp area both in 1952 and again in 1954.

MATERIAL CULTURE

Pottery

The pottery from this area is distinctive and easily separable from the pottery of the other areas. Of the 84 sherds found, the greater part of them belonged to one type, which will be called "Mortlach check-stamped." None of this type of pottery can be found in other parts of the site except for a few sherds in the upper few inches of Project 1C. This established it as at least contemporaneous with the last occupation of this project, and more than likely later, since its appearance is on the western side of Project 1 and none of it appears in Projects 1A or 1B. This material probably represents casual camping around a bog which is said locally to have been a spring in historic times. As such, it would be an overlay over the upper levels of Project 1. This is further borne out by the fact that pottery from below this pottery type (Mortlach check-stamped) in Project 1C, is the same as pottery found in the top levels of the rest of Project 1.

Mortlach Check-stamped

TEMPER—Grit tempered. Grit was unsorted as to size, ranging from a fraction of a millimetre to three millimetres. The material was apparently derived from crushed granitic rock high in quartz and feldspar and containing some mica. Plenty of temper.

TEXTURE—Coarse and laminated.

FIRING—Fired fairly hard on exterior; interior and centre poorly fired and somewhat friable with tendency to split.

COLOR—Buff to grey-black exterior; probably due to poor firing techniques. Interior, black. Poorly fired centre, somewhat grey-black.

HARDNESS—Two to three.

THICKNESS—Rims and shoulders somewhat thicker than body portions. Average rim and shoulder thickness eight millimetres. Body sherds are from 3.5 to six millimetres.

DECORATION

Rim: Usually dentate stamped on a diagonal to right facing exterior. The dentate pattern is definite, but the tools used had shallow nicks or grooves in them. The rim may be plain on top (see Plate 1). Exterior of rim decorated with a series of punctates near the top. Plain-topped rims may have a diagonal dentate pattern (to right facing interior) around the upper exterior of the rim.

Body: An over-all small check stamp has been applied to the exterior of the pot. Checks two to three millimetres in size. This was probably applied with a grooved paddle. The body pattern of checks is applied to the vessel as far as the top of rim, before the punctates are pushed in, since they are pushed in through the pattern. The surface is smoothed over the pattern before firing—in some cases, almost completely obliterating it on body sherds.

Shoulders: The shoulders may have no pattern at all, or may have a pinch or fingernail pattern. The rims are flattened and somewhat rolled inward. Striation indicates a horizontal smoothing on the inside of the vessel.

Vessel Form: Although only portions of these pots were examined, enough rim and shoulder fragments were present to indicate a round-bottomed, squat vessel form, with a pronounced shoulder and incurving rims. They would be relatively small, eight to ten inches in diameter according to the rims, and may be quite shallow. Distribution unknown in western Canada due to lack of proper archaeological excavation. Similar to type found in Montana (Hagen site).

Other Types

It is difficult to say if some of the smooth sherds found belong to a plain-surfaced pot or are simply examples of extreme rubbing of Mortlach check-stamped. We may have plain pottery at this level as well.

In Project 1, the few fragments of Mortlach check-stamped found in the upper level, were associated with a few cord-marked fragments of pottery. These are too few in number to represent a local type; also too scarce to name in other parts of the upper level. These are:

1. A Rim Sherd Shown in Plate 1

This rim is flattened on top, thus thickening the top and seems to indicate a necked vessel. A series of small circular punctates appear on the top inner edge of the rim. They are five millimetres apart and one millimetre in diameter. There is a band of horizontal cord marks around the outside, starting one-half inch from the top. These seem to be made with a small twig or bone wrapped with a single strand of some substance—probably sinew. The outside rim is also indented to the right diagonally with the same tool. This is a very light impression. Temper is the same as Mortlach check-stamped. Firing is a little better, resulting in a grey exterior and a buff interior. This may indicate some inside firing. The texture is a little finer than the previous type, and the pottery is a little harder. The rim varies in thickness from ten millimetres at top to seven millimetres at the bottom.

2. Several Fragments of Cord Marked Body Sherds

These have both rubbed and unrubbed exteriors. They are fairly thin —four millimetres on average—fine grit tempered, and are buff to ocherous buff exterior, and interior with a black core. The pattern is made by a series of relatively parallel cords approximately 1.5 to two millimetres apart, and averaging a twist every three millimetres. The pots seemed to have been rubbed inside and out before the pattern was applied (see Plate 1).

3. A Single-rim Sherd

Rounded rim, sand-tempered, outside rubbed plain. Color is sandy grey exterior with sandy coloured interior. Texture is fine and finely laminated.

STONE ARTIFACTS

Projectile Points

1. Plains Triangular Projectile Point

These points are roughly triangular in shape. They vary in shape from equilateral traingular to somewhat longer than wide.

This is a flake tool constructed from a flake by additional pressure flaking. These tools often show the original flake scars on one or both sides (Plate 1).

DISTRIBUTION—They have a very wide distribution, being found in all three prairie provinces and in adjacent parts of the United States. They seem to be a general Plains type and not characteristic of any one Plains tribe. Average size, twenty millimetres long by twelve to fourteen millimetres wide.

2. Prairie Side-notched Projectile Point

These points are roughly triangular in outline, having shallow side notches just above their bases. This gives the base portion a squared effect. They are made from flakes, but are better worked for the most part than the Plains point. Occasionally a part of the original flake scar will show, but usually the surface has been completely reflaked. The edges are usually reworked with secondary flakes. Usually, but not always, the flat base of the projectile point has been ground smooth. This seems to be intentional—probably to prevent the shaft from splitting when striking its victim. Size, from eighteen to twenty-five millimetres long, with average width of twelve to fourteen millimetres.

DISTRIBUTION—A very common type throughout the Plains region. Found across western Manitoba, Saskatchewan and Alberta, and with very slight variations as far south as Texas. As in the case of the Plains triangular, this projectile point seems to be too well distributed to be considered as characteristic of any one Plains tribe.

Blades

Two fragments of blades were found, but were too small to tell the type to which they belonged.

Scrapers

Hoe-like Scraper

One large artifact of mica schist occurred in the lower level of this occupation at the western end of the site This artifact is oval in outline, with possibly twenty or twenty-five millimetres of the tip missing. It is 107 millimetres long, eighty millimetres at its widest part, and has a maximum thickness of twelve millimetres. It has been chipped all around. The chipping is percussion, and except for a few flakes on the curved edge is worked on one side only. The edge is dulled and somewhat battered by use.

Hammerstone

One hammerstone was found in the camping area. This belongs to the last occupational level. It is ellipsoidal glacial pebble. It is of quartzite material. The smaller end shows some use. It is pinkish in colour, as if it has been dropped into the edge of the cooking fire (illustrated in Plate 1).

BONE ARTIFACTS

Beads

One bone bead was found in the excavation. It is cut from a hollow bird bone. Cutting was accomplished by scoring the bone all the way around and continued scoring until the bead could be snapped off. It is twelve millimetres long and nine millimetres through its thickest cross-section (see Plate 1).

THE MOOSE JAW CULTURE

This cultural complex is represented by the upper deposits in Projects 1, 2, and 3, except where a thin overlay of Mortlach culture occurs as discussed in the previous chapter. The deposit representing this culture is thickest in Project 1B and in Project 3A. However, in the latter project some difficulty has been encountered in separating the occupational levels due to the number of occupations present in a thin deposit. For this reason Project 1B was chosen as the key location for this culture.

FIGURE 2
Project 3A—Moose Jaw and Besant Cultures

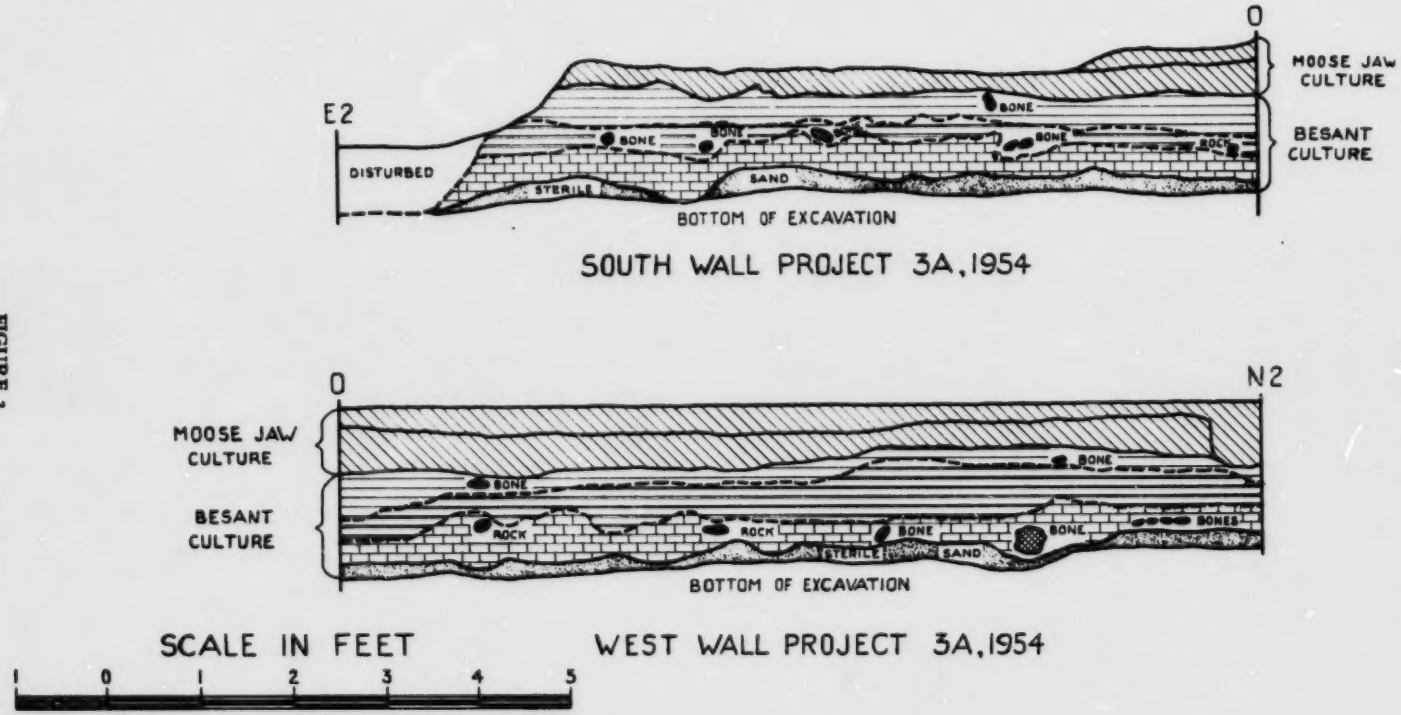


FIGURE 3
Stratigraphy of Project 3A—South and West Walls

In this part of the site it is quite possible to divide the Moose Jaw culture into two levels of occupation. The first starts at the grass roots and continues downward for five or six inches, depending on the portion of the site under consideration. The deposits are noticeably thicker the farther downslope one goes—that is, the northern part of Project 1B has a thicker upper level deposit than does the southern part. This upper deposit consists of camp debris—bone fragments and flakes with a scattering of artifacts. In places, a regular bone layer is evident; in others it is not. This may be partly due to root action, and partly to influences of man. This area has been used as a cattle pasture for years.

ILLUSTRATION 3
Project 1B—Moose Jaw Culture

Beginning on an average of eight inches below the surface, we have a second occupation of this culture. There is a heavy concentration of bone, and this layer can be traced not only in Project 1B, but all the way across Project 1. Definite fireplaces can be found in this level. One made its appearance in square E_1N_3 (see Illustration 5) at a depth of thirteen inches. These are rings of fire-burned rocks two and one-half to three feet in diameter. They are more evident due to the fact that a sandy layer underlies this culture. This sandy layer is sterile, but occasionally fragments of bone, stone, and a few artifacts and fragments of pottery, have been worked into this sand layer by the action of living upon it. Thus, a few elements of Moose Jaw culture may be found pushed several inches down into the sand. We are certain of this for fragments of a pot in the lowest occupational layer in squares E_1N_3 are found at a depth of eight inches and as deep as sixteen inches, although the main cultural layer stops at fourteen inches.

ILLUSTRATION 4
Excavating a Firepit of the Moose Jaw Culture—Project 2

CHARACTERISTICS OF THE CULTURE

The pottery is different in body pattern and design from that of the Mortlach culture. There is a distinct complex of bone tools, well developed; some differences in stonework and more use of skin-working tools than in the previously described culture. Some slight differences may be noticeable between the two levels of occupation within the culture (see Plate 3). However, these are not sufficient to indicate a change of culture. The culture was named "Moose Jaw" because the author is certain from observing material in private collections, and from his own explorations, that some sites along the Moose Jaw Creek, twelve to twenty miles distant from the present site, will produce much more material of this particular culture than has been found here. That is to say, the centre of the culture is to the east of Mortlach in the vicinity of Moose Jaw.

MATERIAL CULTURE

Pottery

Moose Jaw Cord-marked

One of the dominant types of pottery of the culture.

TEMPER—Grit tempered, unsorted and consisting of broken up quartzitic rock.

TEXTURE—Medium fine and thinly laminated.

FIRING—Exterior fairly well fired, some few spots of interior improperly fired.

THICKNESS—Rims and shoulders somewhat thicker than bodies. Rims average seven millimetres and body sherds four to six millimetres.

COLOUR—Grey-black with occasional light tan spots. This has the appearance of a thin outer coat of clay added when the firing was partly completed.

HARDNESS—Two to 2.5.

DECORATION—

Rim: Thumb and finger impressions often with a scored line along the top of the lip. The sides of the rim are straight. The lip is formed by flattening the edge of the rim, and sometimes curves inward (see Plate 2). Vertical cord-markings are applied to the exterior of the rim and seem to have been applied before the lip decoration. There is a regularity of design, suggesting a cord-wrapped paddle. The exterior of the rim has been intentionally rubbed after the design has been applied. A variant of this rim may have exterior notches on the lip approximately one-quarter inch apart, and may be thinner in construction averaging four millimetres. Occasionally this variant is not rubbed on the exterior.

Body: An over-all cord-marked pattern covers the entire pot. This has been applied by means of a cord-wrapped paddle as evidenced by overlapping segments of pattern near the bottom of the vessel. There is a rather flattened appearance to the body pattern, which may be due to the rubbing of the vessel after application of pattern or to the filling in of the pattern by moist clay while firing action is taking place, thus accidently partially obliterating the cord-marking. The cords may have been made from twisted grass, thus giving an indeterminate appearance to the design.

SHOULDER—Regionally thicker and having a fingernail impression or pinch pattern around the circumference of the vessel at this level.

VESSEL FORMS—These vessels seem to be shouldered and squat, with round bottoms, but seem to have a collar effect to the rim (see Plate 2).

Distribution

Although the distribution of pottery in Saskatchewan is little known at this time, the author has seen this variety in sites along Moose Jaw Creek and in the vicinity of Last Mountain Lake. This means a northern and eastern distribution from the vicinity of the present site. Undoubtedly, further excavation in the province will widen the range of this pottery type. A few fragments of psuedo basketry-impressed pottery were found scattered throughout this cultural level. Since discussing this type with Dr. James Griffin of the University of Michigan, October, 1954, the material has been reviewed. The fragment illustrated in Plate 2 is probably the best example of this material found so far. Even though this pattern resembles strongly the woof and warp of weaving, a careful comparison of columns (indicated by the arrows) in Plate 2 will show that these are duplicate impressions and so the pattern was made by a series of single-wrapped rod impressions and not by a paddle pattern at all. This pottery seems to have a smooth rolled rim, at least in some instance s

Moose Jaw Cord-marked Variant

This is the same as the basic type in colour, temper, texture and hardness. The vessel would be straight-necked, and very possibly shouldered. The basic difference is in the pattern. A very closely-woven cord was used to

wrap the paddle and the pattern was applied diagonally to the neck of the vessel. The top of the pot was then flattened to form the lip. Diagonal imprints of a sinew-wrapped stick were made in the top of the lip. These were opposite in direction to the diagonal of the pattern on the neck.

Other Types

1. One plain-rim sherd made its appearance in Project 1C and several plain-body sherds have appeared in this level throughout the site. However, there is not enough difference between this and Moose Jaw cord-marked to indicate a change in type. The same incurved rim, exterior rubbing, and inside horizontal rubbing to the point of scoring, as characterizes the previously described type, occurs as a characteristic of this plain variety. The only noticeable difference is the lack of patterns (Plate 2). This should possibly be considered a variant of Moose Jaw cord-marked.

2. A few fragments of sand-tempered pottery in Project 1B in the lowest level of the Moose Jaw culture. These were approximately four millimetres in thickness and were somewhat nondescript in appearance. A few pieces of grit-tempering were still used, but the major tempering agent was sand—a fine quartz sand. The outside was often rubbed, possibly with a handful of grass, since there are scorations across the outer surface. Sometimes a loose paddle pattern appeared on the surface as in Plate 2.

3. Project 1B also produced a few fragments of thin, very fine, cord-marked pottery. So few fragments have appeared that there is insufficient data to name this pottery for the present. However, a description follows:

TEMPER—Grit tempered, granitic, mostly feldspar.

TEXTURE—Fine, thinly laminated.

FIRING—Fairly hard.

COLOUR—Tan to buff exterior and interior.

HARDNESS—Two.

THICKNESS—Thin, two millimetres in thickness except the very rim itself, which is flattened to five millimetres.

DECORATION—A very clear impression of parallel, twisted fibres appears on all fragments, body and rim. The twists are approximately six millimetres apart and are made by a cord consisting of a few coarse fibres. The impression of these individual fibres can be seen in all of the specimens. They are not rounded, but flat or square, and have an appreciable thickness—approximately one-half a millimetre (Babiche). The cord impressions are applied parallel, three millimetres apart, suggesting winding on a paddle of some type. The cord marking runs in a vertical direction and was applied before the rim was flattened. A line of sharp cuts one centimetre apart, appears around the rim one centimetre from the top. These cuts have sharp edges as if made by the point of an arrowhead when the pot was partly dried. The rim is made by flattening the edge of the pot, and protrudes both outward and inward, but mostly inward. Every twelve millimetres there is an indentation made by pressing downward on the rim with the tip of some blunt implement—possibly an awl or flaking tool. In fact, the tip of specimen 1B-137 matches the indentation perfectly (see Plate 4, No. 7).

STONE ARTIFACTS

Many stone tools were found in the culture in both levels of occupation.

Projectile Points

The predominant projectile points of this culture are the Plains triangular and the Prairie side-notched. These were described in the previous chapter.

Corner-notched Points

One corner-notched point appeared in the upper level of occupation, thirty millimetres long and nineteen millimetres maximum width. The base is small and the notches quite deep (see Plate 3, No. 9).

Eared Points

One eared point also appeared in the second level of occupation. It was twenty-seven millimetres long by eighteen millimetres wide, had an indented base and pronounced lugs or ears (see Plate 3, No. 7).

Tapered-based, Side-notched Point

In the lower cultural level, at depth of fourteen and one-half inches, a large projectile point of white chert made its appearance. It was similar in style to the Prairie side-notched variety, but much larger—forty millimetres long and twenty-one millimetres wide at the base. This projectile point had wide, shallow notches, and was tapered slightly to the base. The base was ground very smooth. It may be an ancestral type to the more popular Prairie side-notched (see Plate 3, No. 8).

These odd types of projectile points give us a clue to the associates of the inhabitants of the Moose Jaw level of occupation. Now we need only look for cultures where these types are predominant to establish trade relations between peoples at this time level.

Blades

Hafted Blades

One blade of petrified wood was found in the upper occupational zone of 1B, which had a shank worked on one end with the obvious intention of attaching it to a handle. Two shallow notches one-third of its length from the base could have been used to assist in lashing the handle securely. The shape of the blade was similar to a steel knife, and may have indicated contact with white man or at least a knowledge of his tools (see Plate 3, No. 10). None of these blades occurred in the second level of occupation.

Ovoid Blades

Ovoid blades were found in both camp levels. The one in the lower level was smaller and more finely made, but the style was the same for both levels. The blades of the upper level were cruder, consisting of primary percussion flakes, while the ones from the lower level had a complete pattern of secondary flaking over the whole specimen.

Several crude blades of another indeterminate shape were found at this level. They were apparently made from whatever material was at hand. The shape of the original stone set the pattern for the finished product. Two examples of these are shown in Plate 3.

Scrapers

These are small stone tools worked on one side only. They are flake tools and often consist of only a few secondary flakes removed from one or both sides of the original flake. By far the commonest scraper is a small "thumb" scraper or "thumb-nail" scraper, so described because of their resemblance to a thumb-nail. Their distribution is world-wide on many time levels, so they can hardly be considered as a diagnostic tool of any culture. They are in reality an end scraper, the business end of the artifact being opposite to the bulb of percussion. Here in Mortlach they appear in both levels of occupation of the Moose Jaw culture. They may be sub-divided into three classes represented in Plate 3.

1. Flat-end Scrapers

These are rough, equilateral triangles, worked around the edge from one side only, forming an edge capable of scraping; but the upper surface of the tool consists of the rough exterior of the original stone, or at best rudimentary and primary flaking. These appeared in both levels of occupation. The specimens illustrated are average specimens. (Stott Site, page 40).

2. Plano-convex End Scrapers

These are equilateral to oblong in outline. The ventrical surface is flat and represents the original flake scar. The dorsal surface is fairly steep-sided, and has been well-worked and shaped. Occasional specimens are quite beautiful, having diagonal flakes crossing them from side to side. The "end" of the tool is sometimes worked at an oblique angle, possibly to facilitate its use by a right or left-handed person. One of these intended for right-handed use can be seen in Plate 3, No. 2. These were found in both occupational levels. Some attempts had been made on several of these specimens to thin the base end of the tool—possibly to facilitate hafting it in some form of handle. However, *no* scrapers were found so hafted.

3. Flake Scrapers

These are in reality reworked flakes. A flake has a few secondary flakes along one or both sides of it, thus making a handy cutting or scraping tool. These were found in both levels of occupation, and are indistinguishable from each other except for size. The largest flake used in this manner was eighteen millimetres long and came from the upper level as did the majority of the larger specimens. This, however, may be unimportant, and may simply indicate greater quantities of material available in the upper level for the flint knapping industry, thus making possible the use of larger flakes for these crude tools.

Choppers

A very rough, but very interesting chopper came to light in Project 3A, at a depth of three and one-half inches, or in the first occupational level. This tool is illustrated in Plate 3. It is a portion of a rough quartzitic pebble worked on the thin side into a crude cutting edge by removing alternate flakes by percussion. The opposite surface is a flat fracture intended to fit the hand. It is a very unique tool. Not the least interesting aspect of the tool, however, is the quantity of baked pottery clay adhering to the rough side of it. The chopper was apparently used in the manufacture of pottery. It was used to break up and work the clay in preparation for its use in making pots. The tool, after use and with some of the clay still adhering to it, was dropped or tossed into the

campfire, thus preserving for us proof that these choppers were used in the pottery industry. Some sand in the clay contained tiny red chert pebbles, giving us a clue to the source of clay used. Clay may be found as outcrops in the Sandy Creek Valley, that has a sand overlying it containing identical red chert pebbles. Thus, the source of material was local, and this tool may have been used to chop quantities of clay loose from the outcrop. Seldom do we have such an opportunity to reconstruct the actions of the individuals living in this remote time period.

Stone "Plate"

A slab of mica schist, ten to fourteen millimetres in thickness, was found in Project 2 in the upper level of occupation (Plate 3). It is broken and the part recovered probably represents one-third of the total object. The edges of the object have been chipped and later rubbed smooth. In fact, all surfaces, with the exception of the broken edge, have been smoothed. It is impossible to say whether this smoothing is the result of use or is intentional. The flat nature of this object suggests the possible use as a plate, but the size also might suggest such a use. It is seven and three-quarters inches to the break. If the estimate of one-third is its actual size, this would indicate an object approximately eight inches by twelve inches. It may have been used as a flat mortar or grinding slab. It could also serve as a griddle. However, there is no indication of the "plate" being subjected to fire. This does not exclude the possibility of a griddle, for it could have been placed on hot stones drawn from the fire and used to slowly cook whatever was placed on it. In any event, it is a very interesting object, and the only one of its kind found in the excavation.

Pipes

Two fragments of a stone pipe were found in Project 1B in the upper level of occupation. The fragments did not fit together, but were obviously from the same artifact. Both were curved and smoothed inside and outside. Their shape and material is similar to some of the stone tube pipes to be found in the Saskatchewan Provincial Museum. However, they could be fragments of the bowl of a platform or other elbow type pipe, and therefore, no conclusions may be drawn regarding the style of pipe from these small fragments.

Bone Tools

These are very interesting artifacts. Their presence in fairly large quantities can be considered as a diagnostic element of the Mortlach culture. Both levels of occupation contained bone tools, but a few more were found in the lowest or earliest occupation layer than appeared in the upper level. This fact may be of little concern, since the whole lower level was thicker, indicating a larger or longer occupation, and a few more of every type tool could be expected. There was a noticeable change in the type of bone tools used, during the two occupations, and these will be dealt with in the type descriptions.

Bone Scrapers or Fleshers

Type 1

Made from a bison radius bone. The cancellous was almost all removed and one side split away, leaving one long, tapered fragment as the functional part of the tool. The joint was left to serve as the butt. One of these appeared in the upper occupational level, 156 millimetres long, and fifty-eight milli-

metres wide (see Plate 4). This is similar in style to Todd Willy's Type 2B, illustrated on page eighty-four, Figure XVII, in the Thomas Riggs Site 39HVI, published by the South Dakota Archaeological Commission for Dr. Wesley R. Hurt, Jr.

Type 2

Made from a large splinter from a bison cannon bone, and different from any illustrated in the South Dakota reports, being almost semi-lunar in shape. It was blade-like in outline, but only the tip showed wear, indicating a scraping function. It had been shaped on the one side by intentional flaking of the bone. This flaking included a depression for the thumb. This depression was in such a position as to make the tool functional when held in either the left or the right hand. Wear on edges showed that it was used in both hands, but predominantly in the right hand.

Type 3

Bone scrapers made from a surface fragment of bone. The cancellous material was partly removed and showed signs of wear. The tip had been worn down on all sides. It was similar to a splinter awl, but had a rounded tip instead of a sharp point. The type specimen is shown in Plate 4. It was seventy-two millimetres long and seventeen millimetres across at its widest spot.

Bone Flakers

Several bone flakers occurred. These were somewhat similar to the Type 3 flaker described above, but were much larger, and have been designated "flakers" after similar tools so named by Dr. Wesley R. Hurt, Jr.,, in his Scalp Creek Site, page 119. (*Note:* The names of most of these tools presuppose a function which cannot be proven, but the common use of this terminology makes its use in this report advisable.) Two good examples of these flakers can be seen in Plate 4. This is a particularly well-made specimen, being constructed from a split rib bone. It is 112 millimetres long and twenty-four millimetres across at its widest point. It has a high polish on the exterior bone surface and on all smoothed surfaces, and is only part of the whole tool which must have been much longer.

Handles for End-Scrapers

These were found in both levels of occupation, but like all bone tools were more plentiful in the lower level. A type handle may be seen in Plate 4. They are all made from bison rib bones. They are made by cutting around the rib progressively deeper, until a deep, circular groove results, then the bone is snapped in two. This is evidenced by a specimen in Plate 4, where the break was not true and still shows the method of manufacture. The fragment which tapers away from the cut end is used as the tool. The sides are polished, as is the small end which is sometimes broken to a blunt point. The cut end has the cancellous material hollowed out to permit the insertion of a scraper or projectile point, thus supplying a handle for a useful scraping implement. So far, in Saskatchewan nothing has been found in place in these handles, butt he opening in the end is such as to accommodate either a thin scraper or a projectile point pushed point first into the opening. (theory advanced by Albert Swanston, Provincial Museum), The persistent smoothing of the most of the Plains

side-notched projectile points of this culture makes this latter theory seem feasible. In the Over Museum at Vermilion, North Dakota, several of these handles are on display as snow-darts. Dr. Wesley R. Hurt, Jr. assures me that there is historic proof of the use of these implements in this manner. Two feathers were wedged in the opening and the implement was skidded along the snow point first, the feathers balancing it. If this use were indicated here it would suggest winter camping in the Besant Valley. This is not impossible, but I doubt if this hypothesis should be considered to the exclusion of the other more utilitarian uses of these tools. It is quite likely that as the occasion demanded the scraper handle became a snow-dart. Although the specimens recovered at this site were plain, other sites in Saskatchewan have yielded specimens of these tools with notches on the sides, or criss-cross patterns, or drawings of fish, birds and tipis scratched into the surface of the bone. This ornamentation probably indicates its use as a snow-dart (Fenanga, 1954, page thirty-five).

Awls

The only type of awl that appeared in the culture was the split-bone awl (Arch. Studies No. 3, Swanson Site 39, Br. 16, page eighty). Two of these were found, one from each level of occupation. They are shown in Plate 4. They were manufactured from a splinter of bone by working the sharp end of the splinter. This smoothing may have been intentional, or may simply have been the results of use.

Miscellaneous Bone Specimens

Two circular fragments of bone were found, one from each level of occupation (see Plate 4). These are almost identical in size, both being twenty-two millimetres long by nineteen millimetres wide. They are also similar in having a smooth and a rough side. It is the author's opinion that they were gaming pieces in some game of chance. Several very thin, flat pieces of bone came from this culture. These had been smoothed on both sides to a very thin edge which could have been used as a cutting edge. However, the fragment found gave little indication of the shape or size of the original tool. One of these appears in Plate 4.

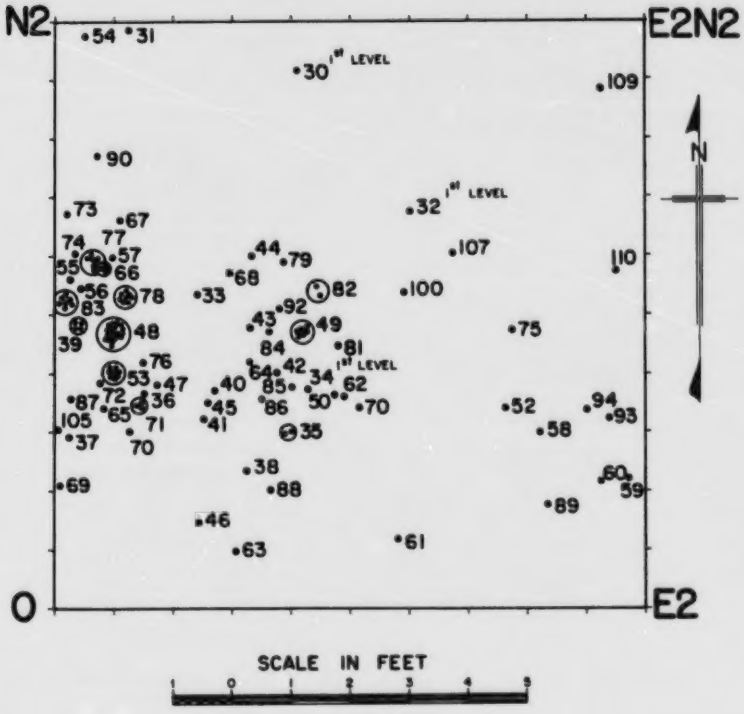
Fish Scales

Apparently a few fish were caught by these people. Four fish scales were found, two in Project 2, and two in Project 1C. All came from the lower level of occupation. The scarcity of this item may indicate that the scales were used for ornament. Fish may not have been used for food, particularly since no fish bone or spines were found in the excavation. However, it is not impossible that a few fish were caught and eaten as a desperate measure during the absence of good hunting.

Shell

A few fragments of shell appeared in the lower level of Project 2, but they were in such a poor state of preservation that nothing could be told about their possible use.

PROJECT 3 SCATTERGRAM SECOND LEVEL



31	POTSHERD	1½"	56 (2)	POTSHERD	3"	78 (8)	POTSHERD	5"
33	"	2½"	57 (2)	"	3"	79	"	
35 (2)	"	1½"	58	"	4½"	80	PROJ. PT.	5¼"
36	"	2"	59	PROJ. PT.	4¼"	81	POTSHERD	4¾"
37	"	2"	60	BLADE	4½"	82 (3)	"	4¾"
38 (split)	"	2"	61	PROJ. PT.	5½"	83 (6)	"	4¾"
39 (4)	"	3"	62	PROJ. PT.	3½"	84	PROJ. PT. (frag.)	5½"
40	"	2"	63	SCRAPER	7"	85	Jasper Scraper	5½"
41	"	4½"	64	POTSHERD	6½"	86	POTSHERD	6"
42	RIMSHERD	3"	65	RIMSHERD	5½"	87 (5)	"	
43	POTSHERD	3"	66	POTSHERD	4½"	88	BLADE	4"
44	Worked Flake	3"	67 (3)	"	5"	89	POTSHERD	
45	POTSHERD	4¼"	68	Chopper with pottery	3½"	90	SCRAPER	7½"
46	SCRAPER	3"	69	BODY SHERD	2"	92	POTSHERD	6½"
47	POTSHERD	4"	70	RIMSHERD	4"	93	SCRAPER	6½"
48	"	4½"	71 (2)	POTSHERD	4"	94	PROJ. PT.	8"
49 (6)	"	6"	72	"	4½"	100	PROJ. PT.	4½"
50	"	3½"	73	"	4"	105 (3)	POTSHERD	5"
52	SCRAPER	3½"	74 (3)	"	4"	107	PROJ. PT. base	4"
53 (8)	POTSHERD	5½"	75	PROJ. PT. (frag.)	4¼"	109	RIMSHERD	3¼"
54	Shoulder Potsherd	4¾"	76	POTSHERD	6¾"	110 (2)	POTSHERD	4½"
55	" "	2¾"	77	RIMSHERD	5"			

FIGURE 4
Example of a Scattergram—Moose Jaw Culture

Evidence of Contact with White Man

Two objects were found of European origin. Both of these appeared in the very top of the upper level.

1. A Blue Bead

Found in square N_2W_4 of Project 2. This is a trade bead of the type commonly distributed throughout the area in the late seventeen hundreds. The fact that only one bead was found indicates its scarcity at this time, and may well move back the time of the late occupation to the seventeen hundreds. A good estimation would be 1750 A.D.

2. Metal Scraper

This was found in the grass roots. It is a very crude tool made by flattening a section of hollow tubing. The metal was tested and proved to be high-speed steel—undoubtedly part of a gun barrel. The metal barrel was seven/sixty-fourths of an inch thick.

Features

There were no indications of a house type anywhere in this cultural level—in fact, nothing in the way of features except fire hearths. These may well be called fire *pits* for they were circular depressions one foot and a half to two feet across, and possible six to eight inches deep, dug into the original surface of the ground during occupation. The sand under these pits was baked hard and reddened by the fire. Burned stone and bone were scattered in and around them, and they contained much ash-impregnated soil; from the top they could be discovered by the observing of the blackened area in the vicinity of the hearth stones. These people apparently lived in tents or shelters and built open fires over which they cooked their food.

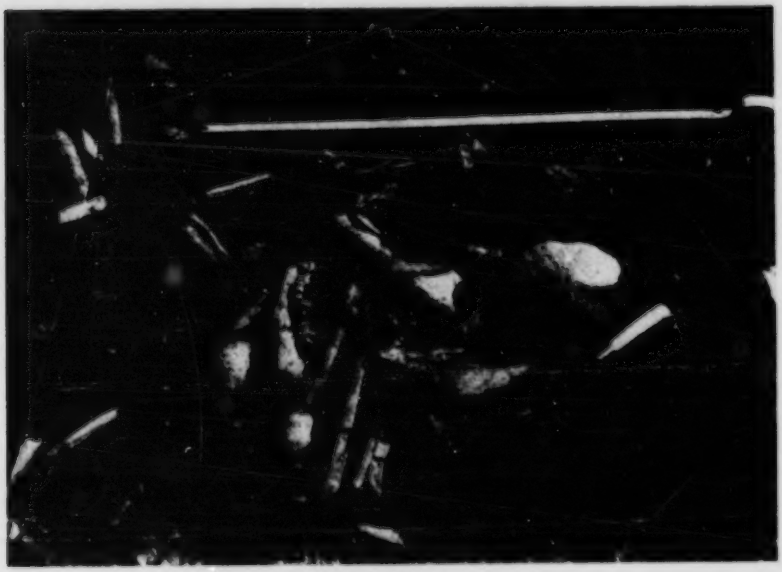


ILLUSTRATION 5
Firepit with Stoves, Bone and Artifacts of the Moose Jaw Culture—Project 1B

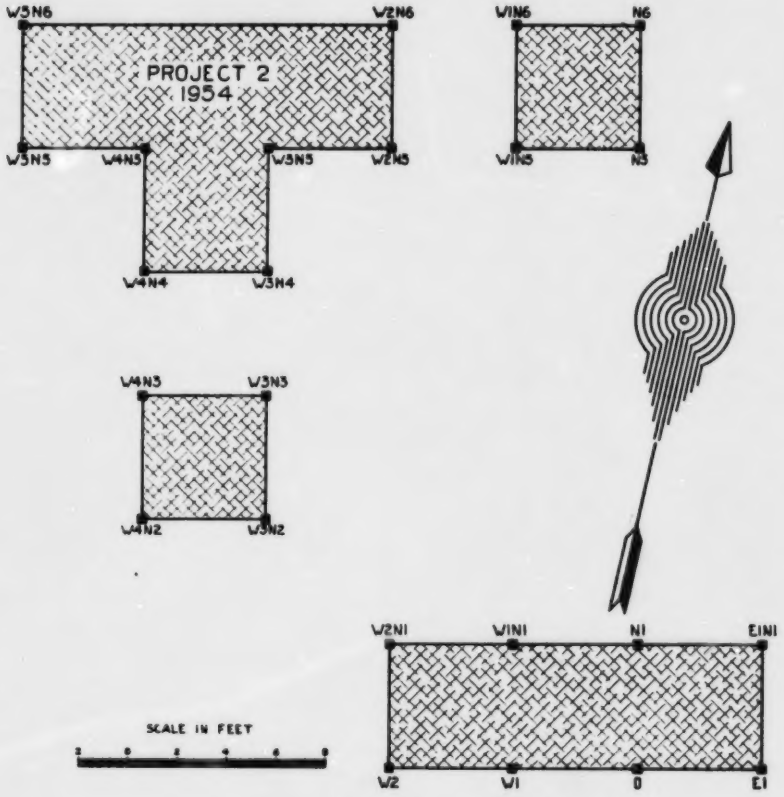


FIGURE 5
Project 2—Area Excavated

THE CARON CULTURE

This cultural level is represented by zone 3 in the stratigraphy of Project 1. This zone lies just above the major occupation zones of the Besant culture and below the lowest levels of the Moose Jaw culture. From observations during excavation it is existent in only the northern portions of the project, therefore the centre of the camp area must lie somewhat to the north of the main excavation. It seemed doubtful if an occupation existed, but when the material was laid out in the laboratory it became quite evident that the material was somewhat different from that above and below it in the stratigraphic column. There was also present a break in the cultural continuity representing a sterile layer, above and below this group of artifacts. Therefore there is no reasonable doubt that this represents the habitation of a group of people different from both the Moose Jaw people and Besant people. So they will be called the "Caron people," and the complex of tools representing their stay at the Mortlach site—the "Caron culture." This Caron culture is not too well represented, but sufficient material was found to give us an idea of what to look for in a future site of the Caron people. An attempt was made to correlate

material from a corresponding depth in Project 3. This failed because of the thinness of the deposit in this region and the difficulty of separating occupational levels from each other. Although some artifacts were recognizably of this culture they were mixed with material of the Moose Jaw culture which had worked downward into the thin occupational zone of the Caron people—probably due to the action of living by the Moose Jaw people (the soil is sand). A scraper of the Caron culture from Project 3 is shown in Plate 5 and indicates the extent of occupation along the Besant Valley. The deep excavation, Project 1, must of necessity be considered the key to this culture, and all of the material considered as representative of the culture comes from here (see Plate 5). The main elements of this culture are described below.

MATERIAL CULTURE

Pottery

No pottery was found in this cultural level.

STONE ARTIFACTS

Projectile Points

These are of two types; an eared point with shallow side notches (Plate 5 shows a typical specimen), and a straight based point with shallow side notches shown in the same illustration.

1. Eared Projectile Points

One complete projectile point was found and one base. The complete point was of brown chalcedony of the typical "Knife River Flint" variety, forty millimetres in length, twenty millimetres wide across the base. The lugs of the base protruded one-half millimetre on each side of body of the point which was only nineteen millimetres at its widest part. The point was nicely tapered and had a maximum thickness of three millimetres. The base was deeply indented thus forming the "ears." One variety of this point was not "eared," that is, it did not have an indentation in the base (Plate 5, No. 7).

2. Straight Based Projectile Point

This point had a similar notch to the one described above but the notch was noticeably shorter. One complete point was found, and one broken one. The complete point is shown in Plate 5. It is thirty-two millimetres in length and twenty-two millimetres in width at its widest place which is just forward of the notches. The base is only twenty millimetres in width. The point is nicely tapered and is only two and one-half millimetres in thickness. It is made of brown chalcedony (Knife River Flint).

Blades

1. Ovoid Blades

The base of one ovoid blade was found in Project 1B. It was made of fine chrystalline chert. It was small, being only twenty-two millimetres in width and would have had a total length of approximately forty millimetres (see Plate 5, No. 10). One crude flake blade was also found in Project 1B. It was roughly oval in shape, but has very little secondary flaking on it (see Plate 5, No. 14).

2. Trade Blades

One small fragment of a trade blade was found and appears in Plate 5, No. 11. These trade blades were large, thick blades of chalcedony being formed by percussion flaking. They were thick and crude and were probably seldom used as a tool, but rather as a source of raw material. They may have been used for monetary exchange and were certainly traded northward from their source. In this case the material suggests the Knife River Flint quarry, Minnesota. This material was the dominant material used by this culture at the Mortlach site. It is recognizable by the taffy colour and the white speckles or inclusions (opaque) found scattered throughout the stone. It is fine grained and easily worked.

Scrapers

The scrapers were mostly of the end scraper or thumb-nail scraper variety. Of these we had plano-convex scrapers and plano-concave scrapers.

1. Plano-Convex End Scrapers

Both the equilateral and the oblong were found and are shown in Plate 5. They are quite small and very well made.

2. Plano-Concave End Scrapers

These are similar to the above type but the upper surface has a single flake removed leaving a depression for the thumb. One complete scraper and part of another of this type can be seen in Plate 5.

3. Curved Scraper or Spokeshave

One curved scraper was found in Project 1B. It was made of white opalescent petrified wood. Two curved scraper faces were worked into the tool, one on the end and one on the side. It is shown in Plate 5 and is forty millimetres long by twenty-three millimetres wide.

4. Flake Scrapers

These are flakes with secondary flakes along one or both sides. They could have been used as either a cutting or scraping tool. Several of these were found. The most outstanding one, and a typical tool of this type, appears in Plate 5. It is of brown chalcedony and is seventy-five millimetres long by forty millimetres at its widest part.

Hammerstones

A very well used chipping or pecking hammer of this culture is illustrated in Plate 5. This primary tool shows evidence of use both as an instrument of percussion in the flint working industry, and as an anvil (sharp lines on the sides of the stone). It is a granite pebble of glacial origin, well rounded, with both ends and sides altered by use. It is forty-seven millimetres long by thirty-five millimetres thick at its thickest point. It is light grey in colour and fits the fingers nicely.

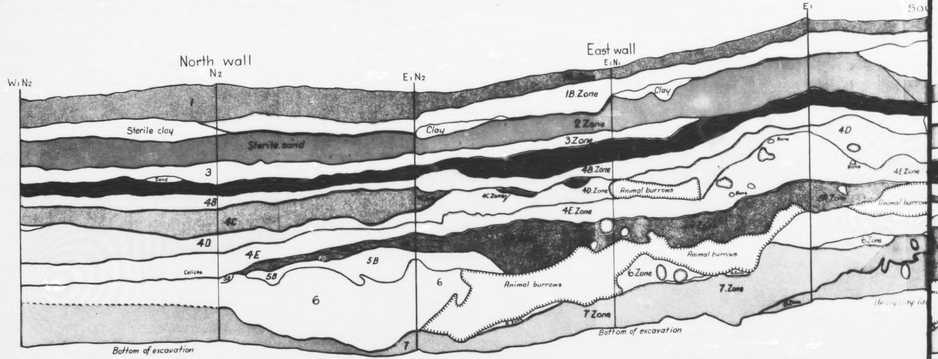
Bone Artifacts

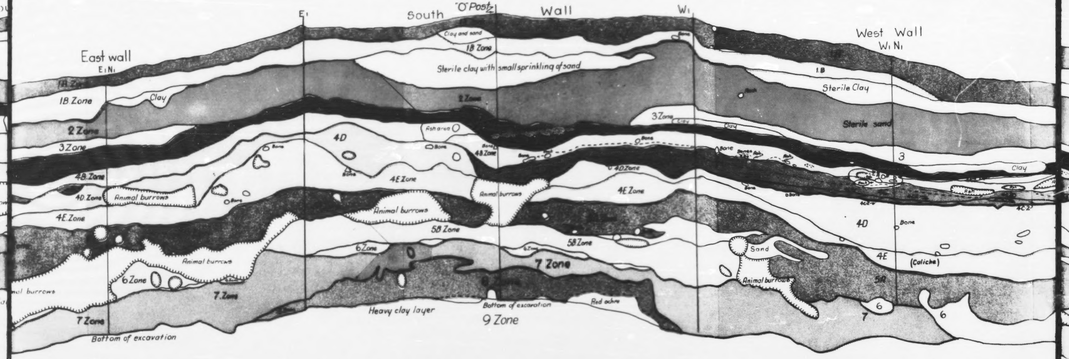
Curved Scraper

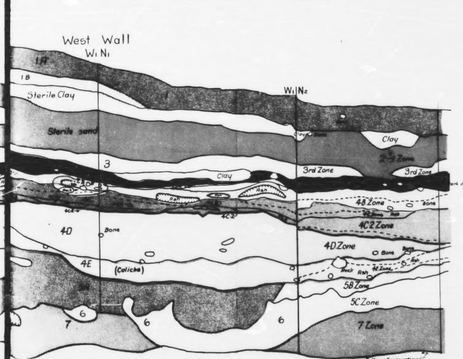
A piece of large bone, deliberately broken and cut to form a curved surface. The edges of this curved surface are worn smooth by use. Its function can only be guessed at—possibly for smoothing leather thongs or in working sinew (Plate 5).

FIGURE 6

Stratigraphic Cross-Section of Project 1C


North wall
East wall
W₁N₂
N₂
E₁N₂
E₁N₁
1
Sterile clay
Sterile sand
3
4B
4C
4D
4E
Caliche
5B
6
7
1B Zone
Clay
2 Zone
3 Zone
4B Zone
4D Zone
4C Zone
4E Zone
Animal burrows
6 Zone
7 Zone
Bottom of excavation


East wall
South "O" Post
Wall
E₁N₁
W₁N₁
1B Zone
Clay
2 Zone
3 Zone
4B Zone
4D Zone
4E Zone
Animal burrows
5B Zone
6 Zone
7 Zone
Bottom of excavation
Clay and sand
Sterile clay with small sprinkling of sand
Heavy clay layer
9 Zone
Rut ashes


West Wall
W₁N₁
1B
Sterile Clay
Sterile sand
3
4D
4E
(Caliche)
Clay
3rd Zone
4B Zone
4C Zone
4D Zone
5B Zone
5C Zone
6 Zone
7 Zone
Bottom of excavation

A worked splinter of bone wedge was found shaped at one end and thin spatulate at the other. It is thirty-seven millimetres wide and tapers to the wedge end—use unknown (see Plate 5).

Several things of interest are notable in this culture. The predominance of brown chalcedony as material for tools. Most of the rest of the material consists of petrified wood, probably obtained in the Cypress Hill region. The plano-concave scraper which appears for the first time in the site. The absence of pottery and the occurrence of a spokeshave or curve scraper in both bone and stone. These elements, plus the well defined projectile point types should be sufficient to make the Caron culture recognizable when encountered elsewhere throughout the province. A glance at the next culture will be sufficient to notice a strong cultural similarity. However, the lack of the curved scraper and the presence of one different projectile type may be sufficient to consider these a different people, although possibly related.

BESANT CULTURE

One of the major cultures of the Mortlach site now makes its appearance. This culture consists of four definite occupations; all but one corresponding to an "A" soil zone. Bone and broken firestone and ash is associated with all levels particularly in the second and third occupations. These occupations are grouped together because of a similarity in the major projectile point type. However, it may be possible to separate these levels as individual cultures when other sites are excavated having similar cultural material.

A glance at Figure 6 will give the reader an idea of the well defined stratigraphy of this portion of the site. In the case of the zones indicated in the figure, the cultural material is concentrated at the bottom of the zone and the top of the zone is a sterile member. This sterile member is in fact the "B" soil zone of the black or "A" zone above, and has been grouped with the lower "A" zone to prevent accidental misclassification of material. Any occupation will have some material tramped into the zone beneath and protruding upward into the zone above. Earth staining seeps downward an inch or so into the level beneath so that the bottom of the "black" layer will contain the tramped in material. However, it is not safe to assume that the top of the "black" layer is the top of the cultural zone. One must take into consideration the material that may stick up from the surface or may be lying on the top of the "black" layer when it was the surface of the ground. Thus, a splitting of the soil profiles and regrouping in the manner used in Figure 6 (fold in chart) is indicated.

Only Project 1 had usable material from all of these levels of occupation. Project 3 contained some material belonging to the Besant culture but the levels of the area excavated were so compressed that separating them was virtually impossible. This material could not be used in establishing the culture. The 1952 test excavations showed at least two levels of occupation of the Besant culture in portions of the Project 3 area. Projects 2 and 4 had no evidence of Besant culture whatsoever. No pottery was found in association with this culture either in the major excavation in Project 1 or in the test excavations made in 1952. Some fragments of pottery were found in the bottom of the excavation in Project 3, but material from the Moose Jaw culture was also found in the bottom of this excavation indicating a physical mixing of the cultural levels.

Amateur archaeologists (notably Mr. A. Hudson) who have dug in this area have reported pottery in connection with material of the Besant culture. However, much of this digging is in the vicinity of Project 3 and would be subject to the same conditions. It may be possible that pottery may still be found in connection with the 4A occupation, but no pottery appears lower than the Moose Jaw culture in the stratified portions of the Mortlach site.

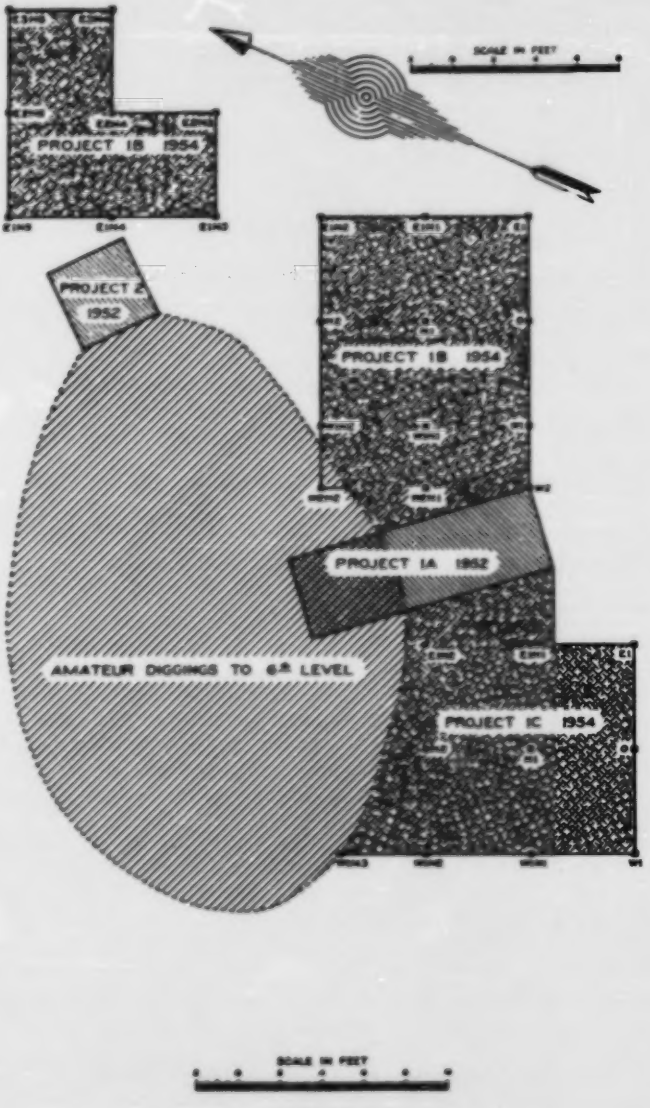


FIGURE 7
Ground Plan of Project 1

OCCUPATION 4A

Material culture at this level is associated with the top of a black soil zone or "A" zone. It is well distributed over Project 1. Although thinning appreciably to the south, Project 1 which was used as the key location was evidently part of the main camp area. Many fragments of split bone littered this level and the earth contained quantities of ash from camp-fires. Cultural material was mostly stone with chalcedony and petrified wood being the predominant stone. A few fragments of worked bone were used, however, and these are described under the heading "Bone Artifacts."

HOUSE TYPE

Not the least interesting discovery in connection with this cultural level was a series of post-holes following a semi-circular pattern across Project 1C. These were first thought to be animal burrows, and some of them appearing in the southeast corner of square O were destroyed before they were recognized as features.

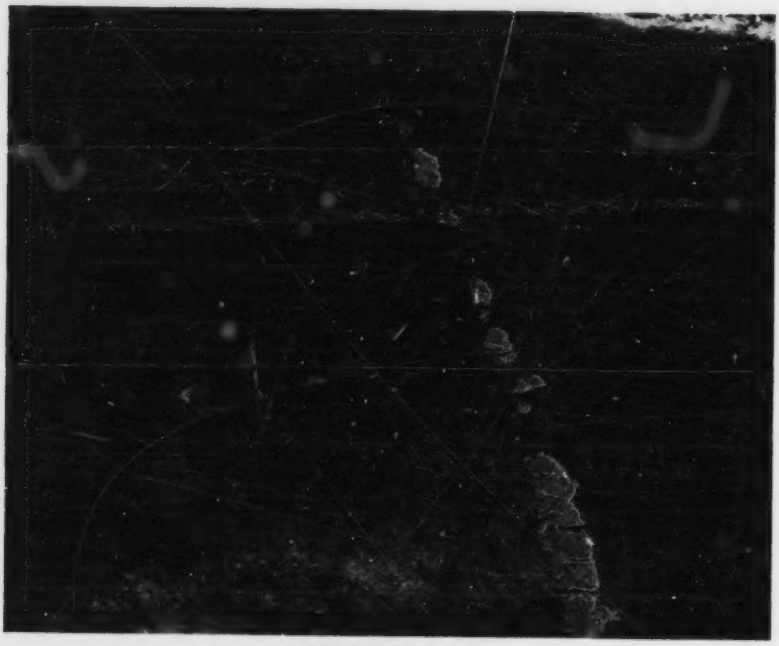


ILLUSTRATION 6
Post Holes—4A House Type

Mr. Alfred Johnson of the University of Kansas deserves credit for recognition of these indentations as post-holes. It soon became apparent that there were far too many of them to be accidental. They followed a definite pattern much like a segment of the house pattern from North Dakota shown in Illustration 7. Further proof of a house type was discovered in excavation square W_1N_1, in Project 1B. Here only a few appeared but they represented a rather small arc of the circle. The total house type would be approximately twenty-five

feet across and circular in shape. Unfortunately no centre pole structure or fire pit could be found since the area represented by the centre of the circle had previously been destroyed by amateurs. Several things are worthy of note: (1) There seemed to be a double line of holes. (2) The holes were quite shallow, only going down a few inches (see Figure 8). They were much too shallow to

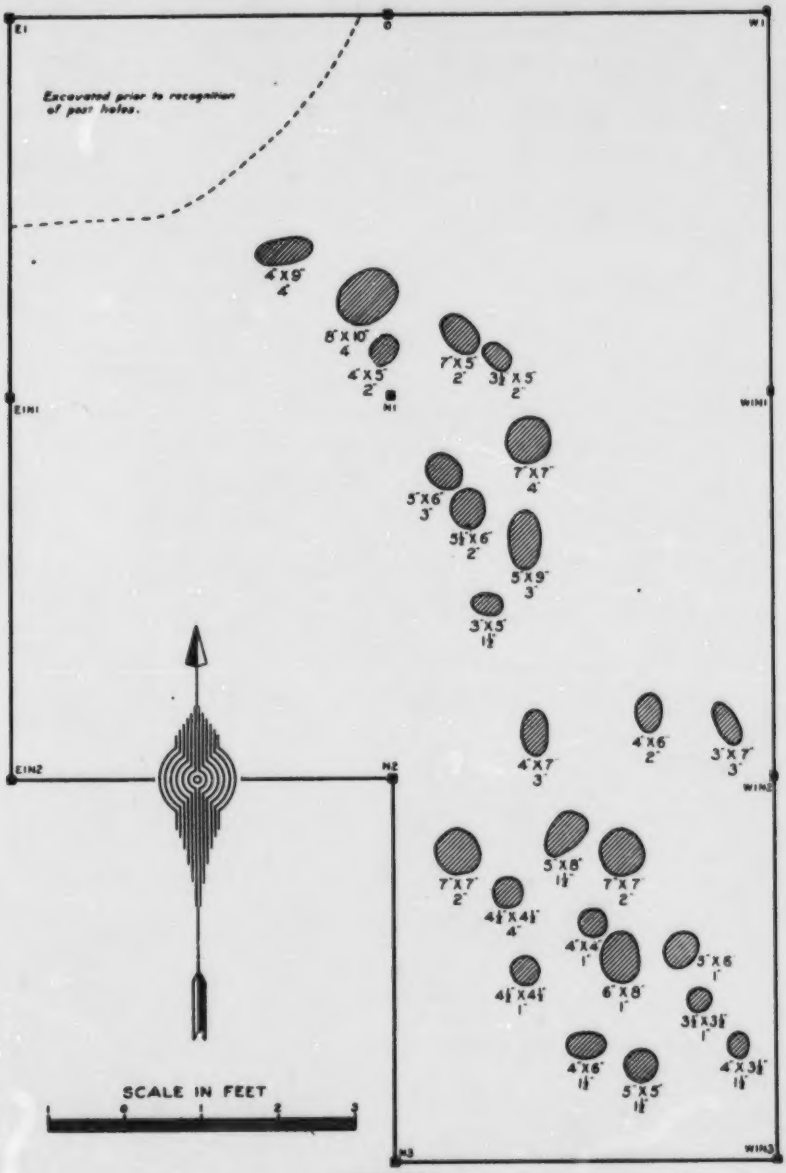


FIGURE 8
Post Hole Pattern Appearing in Project 1C—4A Zone

support a heavy house type similar to the Mandan lodges of the south. (3) The holes were filled with bones and debris—some of these bones were knuckle bones and seemed to have been deliberately pushed in alongside the poles to make them more secure. (4) No remnants of the poles remained in any of the holes. (5) Although shallow, the holes presented in cross-section a profile typical of post-hole structures. (6) There was no indication of a central structure for supporting the roof.

Conclusions

Although obviously intended to help support a structure of some kind this may not necessarily have been a house. It may well have been somewhat similar to the sun-dance lodge. Here a circular structure, open at one end, is made of two rows of upright stakes with brush woven in between to form a loose wall. The centre of the area is free of features except for the centre pole or sun-dance pole. In the 4A occupation a ceremonial lodge of this type would have had its sun-dance pole in the middle of the amateur diggings. Another possibility is a large type structure with a double line of poles pulled together at the top. For security against the wind the ends of these poles may have been placed in shallow holes. The size is quite in keeping with a large tipi or conical tent of the late plains cultures, many of these being much larger than twenty-five feet across. In any event this is the first house type of this kind found in Saskatchewan and its definite association with a particular level of occupation is most interesting.

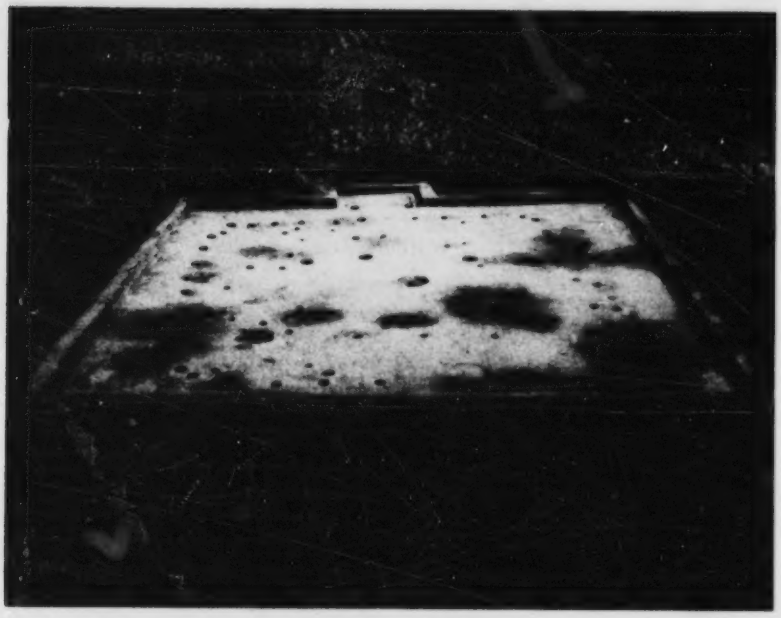


ILLUSTRATION 7
Upper Republic Type House, Hailan County Reservoir, North Dakota
Courtesy of Allan Woolworth, State Historical Museum, Bismarck, North Dakota

MATERIAL CULTURE

Besides the house type mentioned, some tools of the Besant people were scattered through the refuse left by this occupation. These were mostly stone tools commonly associated with a hunting complex. Some worked bone was found and will be described below. Altogether a fair cross-section of the cultural material of this occupation was obtained. Undoubtedly this occupation was a relatively short one or consisted of very few people.

STONE ARTIFACTS

Projectile Points

The characteristic projectile point of this cultural level is short and broad with shallow side notches and a slightly concave base. This base is thinned by striking a number of flakes off the base running toward the tip. This practice is the cause of the slight concavity in the base and creates "lugs" or "tangs" at the corners of the base. Three samples of these are shown in Plate 6. The largest of these is broken at the tip but would have been thirty-seven millimetres long. Its widest part is just above the base and is twenty-one millimetres long and is three millimetres thick at the thickest part. The other two are slightly smaller, but follow the same proportions.

One other projectile point of a different type was found in Project 1C in this level of occupation. It was a corner-notched point of an entirely different type, and identical in size and characteristics with one found in the Pelican Lake culture of a much earlier time. This culture contained many such points. It is, in fact, the characteristic projectile point of the occupational level, and will be described fully under Pelican Lake culture. The point in question is shown in Plate 6. Since it was the only one of this type found in any level other than the Pelican Lake culture, it seems logical that it was picked up by the Besant people somewhere in the valley and dropped among their tools in the area excavated. This is not at all inconceivable in view of the many occupational levels of the Besant Valley. Occasional artifacts must have been found by the native campers, as they lived in the valley bottom, and undoubtedly these would be re-used if in good condition.

Blades

Only one fragment of a blade was found in this occupational level. It is illustrated in Plate 6. It is made of brown chalcedony boldly worked with diagonal concussion flakes. The edges are retouched. It is a portion of a long, slim blade with a very sharp, slightly-jagged side—obviously an efficient tool.

Scrapers

These are of two types: flat-end scrapers, and plano-convex scrapers.

1. Flat-end Scrapers

These are the dominant type of the level, and are formed from a flake having a single flake scar on the ventrical side. The worked end is always opposite to the bulb of percussion. They are roughly triangular in shape, and have a flat top or dorsal surface formed by the removal of two or three flakes. The sides are usually retouched and the scraper is not particularly well finished. The one illustrated in Plate 6 is almost too thick to be characteristic, but otherwise is fairly typical. Most of the flat-end scrapers of this level were broken.

2. Plano-convex Scrapers

One only of this type appeared in the 4A occupational zone. It is a very beautiful specimen (see Plate 6). This artifact is of slightly different material than the rest of the stone tools, and is more characteristic of an earlier occupation of the Besant people. There is a chance that it was picked up by the inhabitants of this period of occupation. However, scrapers of this type were found in other levels of the Besant culture, so it may simply reflect the skill and care of a particular toolmaker.

3. Flake Scrapers

These are common tools, and consist of one or more scraper edges worked on a single flake of no particular shape. A characteristic side-scraper can be seen in Plate 6.

Chopper

One large hand chopper is shown in Plate 6. It is made from a single flake struck from the outside of a quartzite boulder. The edges have been worked mostly on one side, indicating a possible scraping function. One whole side consists of the smooth exterior of the boulder.

Drill

The somewhat spatulate end of a stone drill can be seen in Plate 6. It is made of grey chert, and worked on both sides in a zig-zag fashion. The end is a blunt wedge with sharp edges. This tool fits snugly into the opening in the drilled bone shown in the same illustration, and may well have been used to drill this hole. We have no way of knowing the *type* of drill it was, as the base is missing. The fracture is a fire fracture, indicating that the tool was not broken in use.

Bone Tools

Two man-made objects of bone belong to this occupational zone. They are both illustrated in Plate 6. The largest of these is the socket joint of a mammal. This has been hollowed out—probably with a stone drill similar to the one described above. The end has been cut across and the bone snapped off, leaving a cut end. Obviously the manufactured object is gone and we have only the discarded bone. The hollowing out suggests bone beads or a whistle. The beads are probably correct, since the other bone object is an ornament.

Bone Pendant

A perforated piece of bone, flat on one side and almost dome-shaped on the other. It is very smooth, and was probably lost when the thong holding it wore through the sides of the perforation. The pendant is sixteen millimetres long and would have been slightly longer when complete. It is twelve millimetres wide and five millimetres thick, and the opening is just under five millimetres across (see Plate 6).

OCCUPATION 4B

Separated from occupation 4A by a thin sterile sand zone, 4B is represented by a heavy deposit of camp debris. A regular bed of broken bone, firestone and ash, indicated a well-established camp site. In spite of the quantity of camp refuse, surprisingly few artifacts were found—enough, however, to establish similarity with the people of the occupation above. Except for the

fact that the projectile points were larger, they were identical with the later horizon. A few more tools were added to the complex, notably a new blade type. A carbon date was established by the Saskatchewan Research Council, on material taken from this level. It was made on bone material, since the ash from the fires was disseminated through the soil, and the author didn't believe that the carbon was in sufficient quantities in this soil for dating purposes. Later, the Sandy Creek culture was dated by the use of carbonaceous soil. The soil of this cultural level (Sandy Creek), however, had a greater quantity of carbon in it than that of any other level. The date given by Dr. McCallum on the specimen from 4B was 1580 plus-minus 325 before present. This is somewhat earlier than the author anticipated. The specimens were saved for carbon-14 on the chance that they might give us a possible 1,000 years antiquity. The dating of the site will be dealt with more fully in the conclusions.

MATERIAL CULTURE

As is the case in all of the pre-ceramic levels of occupation, stone artifacts are the predominant evidence of human occupation. No evidence of a house type was found associated with this level. The postholes from occupation 4A extended downward through a part of the 4B level but were of course intrusive. None were found that had their origin in this level of occupation.

STONE ARTIFACTS

Projectile Points

The predominant projectile point is the same as in occupation 4A although the points are somewhat larger in size (see Plate 7). The largest of these is shown in the above-mentioned illustration. It is a very symmetrical specimen made from petrified wood. It is forty-seven millimetres long and twenty-five millimetres wide at its widest part just above the notches, and its thickest cross-section is fifteen millimetres. One small difference between these and the points of occupation 4A is that these points all show considerable grinding or smoothing across the base. This was not the case in the specimen from 4A. There seems little doubt that this smoothing is intentional, probably to insure less likelihood of the shaft splitting upon impact.

One triangular or unnotched specimen was also found at this level. The tip is missing, and seems to have been broken during the manufacture. It is quite sharp and does not have a ground base. Otherwise, if notches were added it would be identical to the rest of the projectile points (see Plate 7).

Blades

1. Semi-lunar Blades

Two semi-lunar blades were found, one very crude with only a few flakes removed, the other very well made and showing evidence of much use—that is to say, it had been resharpened a number of times. One is shown in Plate 7. Both of these have one interesting characteristic: one straight side having no sharp edge. This side has an obvious purpose in permitting the user to apply pressure to the tool without damage to himself. Both tools are of quartzite from local glacial boulders. The largest is eighty-seven millimetres long by thirty-seven millimetres wide at its widest part. It is sixteen millimetres thick—being almost wedge-shaped. The other blade, although cruder, has similar characteristics.

2. Ovoid Blades

Fragments of ovoid blades were found scattered through the camp debris. The largest fragment, made of petrified wood, is shown in Plate 7.

3. Indeterminate Blade

One unusual blade was found at this level. It appears to have been made from a broken projectile point. The base of the point had been broken and then reworked. It is doubtful if it could have been mounted to serve its original purposes, and was probably used as a cutting tool (Plate 7, No. 4).

Scrapers

The same two types of scrapers were found in this level as were found in the level above, and these are illustrated in Plate 7, No. 5 and 7.

Flake Side-scraper

Only one of these came to light in excavating occupation 4B. It is illustrated in Plate 7.

Hammerstone or Pecking Hammer

This specimen is illustrated in Plate 7 and consists of a water-worn granitic pebble having two corners battered while serving as a hammerstone. These corners are opposite the two flat surfaces of the stone, indicating its position in the hand during use. The use marks are plainly visible in the illustration.

BONE ARTIFACT

One small fragment of polished bone is shown in Plate 7. It has a thin straight line etched into its surface. Both the polish and the line seem to be of human origin. It is part of some larger object with an unknown function. No other worked bone was discovered at this level.

OCCUPATION 4C

This occupation level had a rather spotty distribution in Project 1. It was represented only in Project 1C, and this was well developed only in the northwest corner of this excavation. The centre of the camp area was obviously to the north and west of the major excavation. As a result of this, the portion of the camp excavated was small, resulting in very little cultural material. The small amount found is shown in Plate 8. One interesting discovery was a poorly-made scraper of obsidian, indicating the use of this material for the first time in the Besant culture. Another point of interest was the use of rough blades made of a cherty quartzite. These blades were larger and cruder than those found at any other level of the Besant culture. This change of material and style of workmanship may well indicate the use of the site at this time-level by a different people. We do not have sufficient cultural material to establish diagnostic tracts for the occupational zone. We have no alternative

but to describe the material found, and for want of better classification leave this level as the 4C occupation level of the Besant culture. A split in the 4C zone was noticed in the extreme northern portion of Project 1C. Here a subdivision was made in the cross-sectional drawings into 4C1 and 4C2. Careful laboratory study, however, indicated that the cultural material, bone and camp debris, were well distributed throughout the whole thickness of both zones. Thus, the lower black layer may well be a separation of carbonaceous material due to movement in the water table. Therefore, 4C2 could be considered a secondary deposit of carbon and have no bearing on the cultural deposit. For this reason the separation was considered a physical and not a cultural one. It would be ideal if we could separate the crude artifacts from the better-made ones on the basis of this division, but the distribution of the artifacts were such as to entirely eliminate such a possibility. It, therefore, must be considered all one level of occupation.

MATERIAL CULTURE—STONE ARTIFACTS ONLY

Projectile Points

One complete projectile point was all that was discovered at this level. The tip of a second point was found, but lacking the base could not tell us much regarding its type. The fragment, however, was broader and thicker than the corresponding portion of the complete artifact. indicating a difference in style. Both appear in Plate 8. A very small portion of the tip is missing from the largest specimen, but making allowances for this it would be thirty-three millimetres long by thirty-one millimetres wide, with corner notches. It is quite thin, being a little over two millimetres in thickness. Superficially, it is somewhat similar to the Pelican Lake projectile points, but is much wider in proportion to length. It might, however, be considered a degenerative derivative of the Pelican Lake projectile point. In view of its single occurrence and the indication that a better cross-section of 4C culture would yield at least one other projectile type, it cannot be considered as diagnostic of this level of occupation, and may indeed have been picked up in the area by the occupants of this camp. The material is honey-coloured chalcedony and the workmanship is fair.

Blades

Three blades were found, all of cherty quartzite containing vugs lined with quartz crystals. The largest was a typical ovoid blade, 105 millimetres long, fifty-five millimetres wide and twenty-four millimetres thick. It was roughed out by percussion and certain portions were reworked by pressure flaking for a finer cutting edge. It was a good utilitarian tool, and although rough, shows good knowledge of flint-working. The other two blades were almost round in shape and showed the same type of workmanship. All three can be seen in Plate 8.

Scrapers

Two scrapers were found: a very large one of pinkish chert and a small one of black obsidian. These specimens, although different in size and material, are markedly similar in physical characteristics. They are both plano-convex scrapers, having a flake scar for one side. Two sides are almost unworked consisting of rough unfinished portions of the tool. When these tools are oriented in a similar fashion as they are in Plate 8, it becomes noticeable that

the major work has been done on the top and right sides of the specimens, and the most useful portion of the tool could be considered the upper right-hand corner. The largest of these scrapers is forty millimetres from base to top, and forty-one millimetres across the top side (the two longest sides of the tool). The same measurements on the smaller tool are eighteen millimetres and nineteen millimetres respectively. This type of scraper, having one corner the predominant part of the tool, may well be a diagnostic trait of this cultural level.

OCCUPATION 4D

Just below 4C zone is a wedge of grey-brown, slightly clayey sand. This wedge has a quantity of bones imbedded in the soil near the bottom of the zone. Associated with these bones are many evidences of human occupation, including some artifacts. It appears to have been a soil horizon that had the carbonaceous material leached out at a later date. A hard caliche has formed directly below this layer on the west side of Project 1C. However, this caliche gives place to grey sand throughout the rest of Project 1. This grey sand layer has small quantities of carbon mixed with it in places, indicating that carbon may have been present as well on the west side of Project 1. The cultural material has been placed as the lowest occupational zone of the Besant culture. The material from this level has only a superficial resemblance to the Besant culture, but due to the material used in some of the projectile points, it is hard to fit them into any typology. It is the author's opinion that the people of this time level are not the Besant people; however, the evidence is inconclusive, so for the time being they have not been set aside as a separate culture.

MATERIAL CULTURE

No worked bone was found at this level. The only artifacts found were those made from stone.

STONE ARTIFACTS

Projectile Points

Three projectile points and portions of three others were all that were found at this level. The four best specimens are shown in Plate 9. The best made point is one having shallow side notches and an indented base forming "lugs" or "ears." This point is made from pink cherty fine grained quartzite and was made at the site, since a worked core of the same material was found in association with this artifact. It is thirty millimetres long from extended base to tip, 21.5 millimetres wide and three millimetres thick. It is almost identical to one shown in Plate 3, No. 7, from the Moose Jaw culture. In this case there is some evidence of this projectile point being a part of the cultural complex of occupation 4D, while in the case of the Moose Jaw culture the point may well have been an intrusion.

The other two points may well be of the same type, but the rough and coarse petrified wood from which they are made caused their rather indeterminate appearance.

The remaining fragment is from a long and slimmer point and suggests Pelican Lake culture, so may be intrusive.

Blades

Two types of blades made their appearance and may be seen in Plate 9.

1. Ovoid Blades

Two of these blades were found, one very good specimen of petrified wood and one rather crude specimen of grey chert. The petrified wood specimen is fifty-one millimetres long, thirty-one millimetres wide, and seven millimetres thick. The other one shown is slightly smaller. Many fragments of blades were found at this level. These indicated ovoid blades of approximately twice the size of the specimens shown.

2. Square-based Blades

These are small, well made blades (Plate 9). One is complete and measures twenty-six millimetres long by twenty-eight millimetres across the base which is its widest part. The upper end is rounded and is made of petrified wood. Neither specimen shows signs of being hafted.

Scrapers

1. Plano-convex Scrapers

One very beautiful specimen is shown in Plate 9. It was the only complete one of this type to make its appearance at this level.

2. Flat-end Scrapers

Several of these were found in this occupational zone. Two rather typical specimens are shown in Plate 9. This type of scraper has been previously described.

3. Flake-side Scrapers

Five scrapers of this type were found, two of which are illustrated in Plate 9. One specimen is a bit unique being somewhat similar to some found by Dr. Richard S. MacNeish of the National Museum at Ottawa, which were associated with cultural horizons in the Yukon (Plate 9, No. 8).

4. Curved Scrapers

Three specimens of curved scrapers were found, one of which is shown in Plate 9, No. 7. These scrapers usually consist of a thick flake with one blunt flat end. The opposite end is worked or battered to an edge. The flakes are short and may be "use" flakes. The worked surface is slightly curved forming a small chisel-like tool. In fact, the edge greatly resembles a wide curved wood chisel. Its function can only be guessed, but it may be assumed to be a wood working tool. The author has some doubt whether these should be called a tool or not. Many appear in amateur collections throughout the province and are known locally as "chisels." As a tool these curved scrapers or "chisels" are almost as common as flat-end scrapers throughout the Canadian Plains.

SANDY CREEK CULTURE

This culture comes from the layer 4E which according to the soils analysis is a well established "A" zone, or the surface horizon of a buried soil. There are several reasons why it should be separated from the Besant culture—a change in the projectile point type; the addition of a new type scraper; and

the addition of several bone tools including the first evidence of a bone tool manufactured by flaking the bone. Throughout a portion of Project 1, notably the southwest corner of Project 1C, a grey caliche layer had formed at this level cementing the bones and artifacts into the black ash layer. The soil from this layer contained so much ash that a carbon date was obtained from the soil sample. See Figure 10. No outstanding features were observed during the excavation of this level. The floor of the Sandy Creek occupation zone was fairly steep, however, dipping toward the south and west. This steepness was a reflection of the lower beds which dipped sharply into an old unused stream channel, belonging to the pre-cultural period.

ILLUSTRATION 8
Clearing Off Level 4E—Project 1C

MATERIAL CULTURE

As mentioned above a whole new bone complex made its appearance at this level. Among these was a highly polished awl or needle. A large rough blade worn smooth on one side was probably used as a tanning tool. Also worthy of note was the use of native stone—very little imported material. Good material must have been scarce for a fragment of clear crystalline quartz was found with evidence of an attempt to make it into a tool. This material was definitely a desperation material to the toolmaker. A description of the most important items of material culture follows.

STONE ARTIFACTS

Projectile Points

Only one type of projectile point was found in this cultural level. Two of these are illustrated in Plate 10. These are short, thick, rather misshapen points. One is a plano-convex in shape (Plate 10, No. 2). They are characterized by shallow open notches and slightly indented bases. Unlike those of the upper levels these points have bases which are thinned all the way across not just in the centre. The most symmetrical of the two points shown is twenty-eight millimetres long, nineteen millimetres across the base which is the widest part of the point and is five millimetres thick.

Blades

1. Ovoid Blades

The commonest form of blade is ovoid. Two specimens are shown, one small and very well made. Fragments of several others indicate a similar shape. The one specimen which seems to differ has probably acquired its shape because of the inability of the toolmaker to make an ovoid blade from this rather irregular piece of stone (Plate 10, No. 4).

2. Semi-lunar Blades

A rather square piece of mica schist has been worked into a crude blade. Upon examining the specimen its seems doubtful if it functioned as a cutting tool, even though the flaking is on both sides of it. The sides of the tool near the edge are worn smooth as if rubbed constantly. It was probably used to work the skins during the tanning process where a rough tool is desired and the flaking, as well as shaping the stone, was intended to make an already rough surface even rougher (Plate 10, No. 17).

Scrapers

1. Flat-end Scrapers

Several broken specimens of this common tool were found at this level. One of these, made of red jasper, is shown in Plate 10, No. 5.

2. Domed-end Scrapers

One end scraper is somewhat different from those found in late horizons, it is shown in Plate 10, No. 3. It is worked top and bottom, however the bottom is only slightly convex. The work seems to be an attempt to thin one side and make the artifact more symmetrical. The main characteristic of the tool is a domed top with a dorsal ridge formed from flaking both sides. The specimen shown is eighteen millimetres wide by seventeen millimetres long and is eight millimetres thick from the top of the ridge to the base.

3. Flake Scrapers

Several flakes have a scraper face worked on one or more sides. Of the specimens shown in the illustrations, one is a large crude flake seventy millimetres in length, another about half the size, and the third even smaller.

4. Curved Scrapers

These are similar to ones found in later horizons. Two of these scrapers or "chisels" are shown in Plate 10.

BONE ARTIFACTS

The bones used for tools in this level have been partly permineralized thus preserving very well the evidences of their use.

1. Bone Scrapers

Two fragments of large bones have been used as scrapers or to rub and work hides. These are illustrated in Plate 10. The used surfaces are rubbed smooth and are indicated by the arrows. One of these is unique. It is flaked, the edge being formed by a series of percussion flakes. This is the first level at which flaked bone has appeared.

2. Bone Sewing Awl

This is undoubtedly the most interesting bone tool found in the site. A fragment of a large bone has been broken in such a manner as to fit between thumb and fingers, the thumb resting on the inside of the bone from which the cancellous material has been removed. It has been split and rubbed to a fine point (Plate 10). When oriented as in the illustration one can see two tiny notches to the right of the point near the tip. Under a microscope these notches show a rounding and smoothing action as if worn by the movement of a fine thread of sinew. On the left side of the tool just back of the tip is a series of similar worn notches. The tool was obviously used for sewing. A very fine sinew was caught in one of the notches near the tip and pushed through the material. On the return stitch the tension on the sinew would be taken up on the left side of the tool, preventing the sinew from slipping out of the notches near the tip until it could be pushed through the hole. As each stitch after the first would require the slack to be taken out of the "thread," eventually a series of notches would be worn on the left side of the tool. It must be borne in mind that the holes in the skins were probably made beforehand with another tool. The skins also may well have been tanned to the same softness as good chamois. Certainly the sinew used was at least as fine as our No. 10 cotton thread. The smallness of the notches proves this fact. The resulting sewing would be on a par with good hand stitching of today.

3. Miscellaneous Tools

Two other fragments of worked bone are shown in Plate 10. Their use is problematical. One seems to be a smoothed portion of a split ritbone with a spatulate end. The other specimen shows signs of rubbing but gives no clue as to its function. Its size and shape is somewhat similar to the gaming pieces of the Moose Jaw culture.

SHELL ARTIFACTS

One large shell belonging to the genus "Unio" or clam was found. It was in such a poor state of preservation that it crumbled when moved.

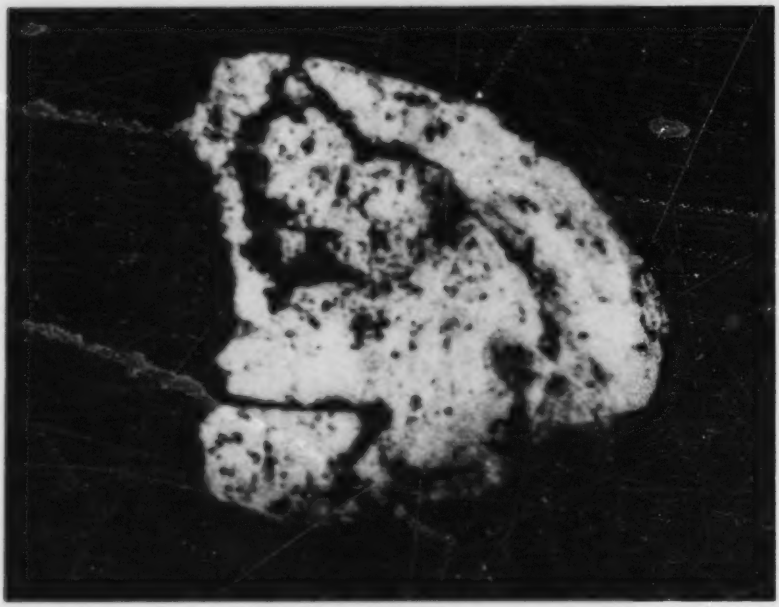


ILLUSTRATION 9
Fragment of Shell from 4C, in Situ

PELICAN LAKE CULTURE

This level of occupation was found in 5A, the uppermost of the sand levels. As mentioned previously these sand zones were laid down by the stream during fairly heavy flood periods. This uppermost layer represented the last of these fast water deposits. The people of the Pelican Lake culture probably lived during the drought period that marked the closing phase of this rather heavy wet period starting shortly after the long drought (see Figure 11). All of the sand zones were laid down during this period and each one represented a flood, followed and preceded by a dry period, if not a drought. There was evidence of human habitation in each one of these zones, however more will be said about these under the next cultural heading. The material culture associated with this level was found in the top few inches of the top sand zone and so must have been dropped on the surface of the sand by people who lived there after the deposition of zone 5A. The action of living would cause material to sink a few inches into this soft surface. In excavating the 5A zone ripple marks became evident in the bedding of the sand. These could only have been formed by flowing water. It should be safe to assume, therefore, that during the deposition of these sand zones, at least during the initial stages of the deposition of each of them, the stream flowed in a broad flood across the valley floor. This 5A zone, however, is overlain by the fine sands and silts of the 4E zone which is the beginning of the less violent cycles represented by ponded or slack water deposits of the valley flood plain. Zone 4E remained as a surface zone long enough to form a well defined "A" zone and to cause 5A to become a "B" zone of this soil profile. Therefore, we would anticipate no disturbance of the upper portion of 5A. This is further substantiated by the consistency of the cultural material from this level. Fragments of broken bone and some charcoal staining appeared in this level.

MATERIAL CULTURE

Only stone artifacts were present at this level, but these were distinctive enough to prove interesting. The projectile points were of the corner-notched type. No other variety was present. A poor selection of tools were found. In fact, projectile points and curved scrapers were the main elements of material culture found at this level.

Projectile Points

Two very beautiful examples of the flint industry came to light at this level. They are corner-notched points with an oval cross-section. The workmanship is superb, with very fine parallel and diagonal flakes running across the specimens. If these points were stemmed instead of notched they might well be assigned to a much earlier time period on the basis of their workmanship. All six projectile points found at this level may be seen in Plate 11. These points are bevelled to the edges and toward the base. They are widest just above the notches and taper to a long symmetrical point. The base is somewhat narrower than the widest portion of the point, and in the three largest specimens the bases are ground smooth. The largest specimen is made of moss agate. The tip is broken, but if the angles of the sides are extended they reach a point seventy millimetres from the base. It is exactly twenty millimetres wide just above the notches, fifteen millimetres across the base, and in no instance is thicker than four millimetres. The other similar specimen is only slightly smaller and made of yellow jasper. A shorter specimen of very poor petrified wood is probably a utilitarian form of the same type. The three tiny, rather non-descript projectile points in Plate 11 are flake points. All are made from a small flake, having a flake scar on one side, and as a result are somewhat plano-convex in shape. They are similar in principle characteristics to the large types but lack their care in manufacture. They obviously were mounted on smaller, lighter shafts. The marked difference in workmanship suggests a special use for the two beautiful specimens, possibly ceremonial killing. The utilitarian type of projectile point is identical in style and size with the isolated specimen found in the 4A occupational zone. It is also similar enough to the one specimen from 4C to suggest that this level of occupation was the origin of both of these specimens.

Blades

These seem to be made in the shape dictated by the material used. Two broken, rather indeterminate specimens are shown in Plate 11. The general trend seems to be toward an oval shape.

Scrapers

1. Flake Scrapers

One only appeared at this level. It is made of brown chalcedony and is very well made.

2. Curved Scrapers

The three specimens appearing in Plate 11 are all that were found in this cultural level. The largest, which is made of variegated jasper is a very excellent and characteristic specimen of this type of tool. These tools are described under the Besant culture occupation 4D.

EARLY PELICAN LAKE CULTURE

Going downward from the 5A zone, which is the carrier of the Pelican Lake culture, we pass through a series of water deposited sand zones. These show signs of erosion or at least very uneven deposits (see Illustration 11). They can be separated into zones on the basis of their physical characteristics. The material found seems to follow these physical separations, but because the stream may have reworked the deposits we cannot with certainty state that the material found in these zones is in situ or that they represent a zone of habitation. Material from zone 5B and 6 certainly seems to be characteristic of the Pelican Lake culture. These two levels have been grouped together because the spotty distribution of zone 6 (a coarse yellow sand zone with some ocher) makes it impossible to say whether the material originated in 6 and was reworked by the stream into 5B or whether part belongs in each zone. Fragments of bone and some charcoal were found in zone 6.

Zone 7, a grey sand layer which in some parts of the excavation became consolidated into a caliche zone, is better established than the zones 5B and 6. It can be found throughout Project 1 and contained some very large bison bones which have been sent to Dr. Bertram Schultz for identification.

If we consider flaked bone tools and the domed scraper as characteristic of the Pelican Lake culture (and they seem to be) then zone 7 represents the earliest occupation of the Pelican Lake culture in the Mortlach site. There seems to be nothing to connect the material in zone 7 with the Thunder Creek culture of zone 8. No projectile point appeared in zone 7 but the portion of one found had the same characteristic workmanship as the Pelican Lake material (diagonal flaking). In view of cultural evidences of similarity with the Pelican Lake culture and lack of similarity with the Thunder Creek culture, I believe we are safe to assume that zone 7 is ancestral Pelican Lake.

MATERIAL CULTURE

This has been somewhat dealt with under the previous heading. Plate 12 shows Pelican Lake material from zones 5B, 6 and 7. The lower portion of the plate shows bone material from zone 7—ancestral Pelican Lake culture. Of interest is the fragment of bone with lines or striations on it. These seem to have been the work of roots and indicate that the bone fragment was buried in the root system of an early soil surface. Link this with the bone fragments and bits of charcoal found in zone 6 and there seems to be little doubt that the valley was grown over with vegetation and was also inhabited during the time period represented by zone 6.

This must have been a short drought period during the long wet cycle represented by the sand zones 8 to 5A. Certainly the stream took over the valley again and, as can be seen in Illustration 11, left only remnants of zone 6 for us to excavate.

OCCUPATION ZONES 5B AND 6

EARLY PELICAN LAKE

STONE ARTIFACTS

Projectile Points

One very beautiful specimen of the diagonal flaked variety was found in the upper levels of zone 5B. It was thinner, and if possible, of better construction than the points from the Pelican Lake occupation of zone 5A. Although

shattered, enough remained to reconstruct its size and shape. It was of brown chalcedony and secondary flaking on the edges gave it a very fine serration. The reconstruction indicates an approximate length of sixty-four millimetres width above the notches of twenty-four millimetres. It was tapered to the sides and point and had a maximum thickness of four millimetres (see Plate 12, No. 2). A second point of fine-grained, cherty, quartzite was similar but was also better made than the later points. It was forty millimetres in length, eighteen millimetres in width and six millimetres in thickness. It came from level 6 or its equivalent. It was not ground smooth on the base, but was somewhat convex in shape.

Scrapers

1. Concave Scraper

Made from a grey chert pebble, probably a "pusher" type scraper. Shows wear on all edges but mostly on the worked end (Plate 12, No. 14).

2. Flake Scraper

A large flake of brown chalcedony has been flaked on one edge to form a very serviceable tool. It has a total length of sixty millimetres (see Plate 12, No. 10).

BONE ARTIFACTS

One fragment of bone, previously mentioned, has lines or striations on its surface. These, on careful study, show a branching pattern indicating that rootlets have grown into the surface of the bone. Although not a tool in the strict sense of the word, this fragment of bone is important. It indicates a plant system or surface growth on top of bone fragments in this area where the cultural material was found and that the associated Pelican Lake material represents a habitation of these prior to the zone 5A habitation.

ANCESTRAL PELICAN LAKE OCCUPATION ZONE 7

STONE ARTIFACTS

Projectile Points

The tip of one projectile point was found (Plate 12, No. 1). As mentioned before this has diagonal flaking and is somewhat similar to the other Pelican Lake projectile point.

Blades

Two very fine ovoid blades were found in this level of occupation. One very beautiful specimen of variegated jasper (red, yellow and green) is thirty-five millimetres long, twenty-eight millimetres wide and 6.5 millimetres thick. It may not truly belong to this level, although similar to the other specimen. The red colouration is a red patina over the original flakes of the tool. The edges of these flakes are somewhat smoothed by water or wind. The true colour of the stone is only apparent where fresh flakes have been removed by the people of this occupation who resharpened it for their own use. The region (sand dunes) a few miles north and west of the Besant Valley has yielded artifacts of the "Folsom" and "Yuma" cultures and this artifact may originally have belonged to one of these earlier cultures. The red patina is very similar

to that seen by the author on Libyan desert specimens and may have something to do with the high temperatures of desert or near desert areas. The other specimen, although slightly larger, is very similar. It is of variegated chert (red and white) and lacks any indication of patina. The flakes are fresh and clean looking and very likely indicate an origin at this level of occupation. Length, forty millimetres; width, twenty-eight millimetres; thickness, eight millimetres (see Plate 12).

BONE ARTIFACTS

Two bone tools belonging to this level appear in Plate 12. One is a thick splinter of bone with evidences of use on both sides of the tip; the other, a large fragment of leg bone having a row of fine flakes worked on one end. The nature of this scraper is such that it could not have been used on a flat surface such as a stretched hide. The worked portion indicates use on an object to which the tool could be fitted—such as a tent pole or spear shaft. If the hide were wrapped around a pole, portions of it could be scraped with this tool.

Scrapers

1. Domed Scrapers

These are the dominant type of this cultural level. The largest is of grey-green chert, thirty-four millimetres long, twenty millimetres wide and six millimetres thick. All three are to be seen in Plate 12. The one which doesn't seem to conform to style, on closer observation will be seen to differ only because a portion of the upper surface refused to flake away as desired. The workmanship is the same and, with allowance for faulty material the scraper conforms to the pattern of the domed scraper (Plate 12, No. 6).

2. Flake Scraper

One only appeared in level 7. This is shown in Plate 12. The worked edge of the flake is slightly curved.

THE THUNDER CREEK CULTURE

This is the earliest cultural level of the site. It rests upon the clay of the valley floor. The artifacts representing its material culture and the bones and camp debris of its habitation are cemented in a sand deposit containing a concentrate of heavy minerals (garnet, magnetite, etc.) lying on this clay. This is covered by a coarse sand, poorly rounded, which merges into a clean yellow sand somewhat finer. This latter sand is sterile and varies in thickness from two to six inches. It separates securely the Thunder Creek culture of zone 8 from the ancestral Pelican Lake culture of zone 7. This level was first discovered in 1952 and was dated in 1953 at 3400 plus-minus 200 years B.P. or 1445 B.C.

Due to the wetness of the season only a portion of Project 1 could be carried to the Thunder Creek cultural level. However, this portion yielded numerous artifacts which, added to the material obtained in 1952, gave us a fair idea of the material culture of these early inhabitants.

MATERIAL CULTURE

The cultural material from this level shows a distinct change from the Pelican Lake culture above. The projectile points are stemmed. The stem is somewhat flaring and the bases are predominantly concave. Of the four

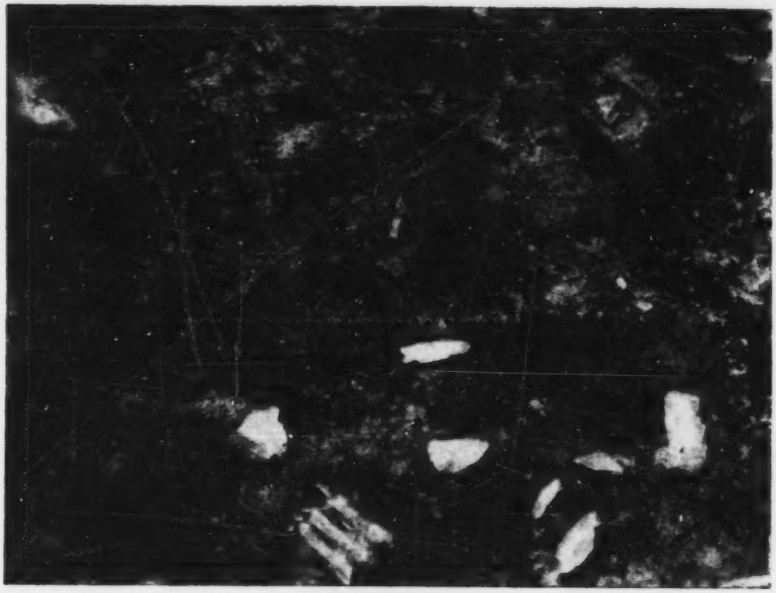


ILLUSTRATION 10
Thunder Creek Culture, 1952, in Situ

points encountered three have concave bases and the fourth, although broken at the base, has a suggestion of concavity. The material found in 1952 is shown in Plate 13, and that found in 1954 in Plate 14. The cultural complex includes coarse chopper tools and large scrapers as well as fine artifacts. Much use was made of local stone (quartzite pebbles) in the manufacture of tools.

STONE ARTIFACTS

Only stone artifacts were found at this level.

Projectile Points

As mentioned above the points are stemmed and have a concave base. The largest of these, of grey chert and just under two inches in length, has a shoulder on one side. The others do not have this feature. Three have a slight flare to the base. The fourth (Plate 14, No. 3), although broken at both ends, has no shoulder, shows very little suggestion of a flare to the base, but under the microscope does show flakes off both sides of the specimen in the centre of the base. Thus only the "lugs" have been broken off and this specimen also has a concave base. The specimens speak for themselves and appear in natural size in Plates 13 and 14.

Blades

All blades or fragments of blades but one fall into the ovoid class. The most beautiful specimen was found in 1952 and is shown in Plate 13. It is made of variegated, fine-grained chert in grey and mauve. Several are of petrified wood and one of cherty quartzite. The one exception seems to be squared at the base. A closer look at the specimen, however, shows that it is a complete specimen since the broken edges are somewhat flaked. In this instance the shape does not indicate style but is only a reflection of the shape of the original fragment of stone used.

Scrapers

1. Pebble Scrapers

Two magnificent specimens of pebble scrapers are shown in Plate 14 at half natural size. These are made from the outside flake from a quartzite pebble and both show signs of smoothing from use.

2. Flat-end Scrapers

These seem to be the predominant small scraper, one appearing in 1952 and two in 1954 (see Plates 13 and 14).

3. Flake Scrapers

Several of these appeared in the 1954 excavation. Three are shown in Plate 14. The largest of these is of grey chert with a heavy black stain. It is fifty-four millimetres long, thirty-eight millimetres wide, and has a scraper edge worked on both sides of the flake.

Choppers or Cores

Two of these appeared in the 1952 excavation and one in 1954. They are very rough tools. All show some signs of secondary flaking, but their function is uncertain. They are shown half-size in Plates 13 and 14.

PALEONTOLOGY

Specimens of bone material for identification were collected from every level of occupation. These were limited to bones showing good articulate surfaces. Since no paleontologist was attached to the staff at the excavation, all the material collected was sent to Dr. Bertram Schultz, Paleontologist and Director of the Nebraska State Museum, University of Nebraska, Lincoln, Nebraska. Dr. Schultz has for years been working on comparative bison material, specializing in the extinct species. The results of his laboratory work have not been presented at the time of going to press. When this information is received it will be printed as a supplement to this publication.

Part II

PHYSICAL FEATURES AND SOILS OF THE MORTLACH ARCHAEOLOGICAL AREA

H. C. Moss—*Saskatchewan Soil Survey*

In the summer of 1954 Mr. Boyd Wettlaufer, Provincial Archaeologist, requested the assistance of the Saskatchewan Soil Survey in a study of the soils at the archaeological sites near Mortlach. Due to the unfavourable weather and to the demands of regular survey work it was not possible to deal with this request until late in September. At that time H. C. Moss visited the field camp and the main excavation. Several discussions were held with Mr. Wettlaufer, and eighteen samples of soil were secured for analysis. Several traverses were made in the surrounding area to check physical features. Subsequently, laboratory work on the soil samples was carried out by W. K. Janzen and A. K. Ballantyne. J. G. Ellis prepared the sketch map shown in Figure 9.

In view of the limited time spent on this study, no attempt is made to interpret the soil information from the standpoint of the archaeological study. The history of the successive depositions could only be determined by detailed studies in the geomorphology of the area. All that may be claimed for the present study is that some information is provided on the physical features of the surrounding area and on the soils at one of the archaeological sites.

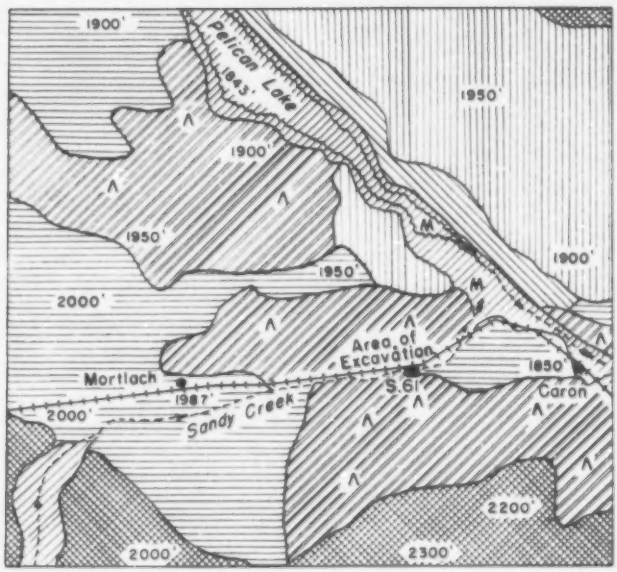
PHYSICAL FEATURES OF THE MORTLACH AREA

Two major physical features or land forms occur in the Mortlach area: a lower, undulating to nearly level plain, and a roughly undulating to rolling upland. The former includes the western end of the Regina Plain, which represents the bed of glacial Lake Regina. This western section of the lake bed includes the uniform heavy clay deposits of the deeper portion of the lake—occurring chiefly at and below 1,950 feet, and the lake—marginal silty and sandy loams occurring up to 2,000 feet above sea level. A rough boundary between the lower lake plain and the lake margin is formed by a glacial drainage channel, now occupied by Pelican Lake and Thunder Creek. Bordering this channel, sandy-silty deposits occur at elevations below 1,950 feet and these deposits may represent deltas deposited when the stream was running into the lake.

The rougher upland lying to the south of the glacial lake plain is part of the Missouri Coteau. In the present area the upland consists of clay loam and loam glacial-till deposits. These deposits extend from about 2,000 feet to 2,300 feet.

The upland is characterized by "wavy" undulating to strongly rolling (knob and kettle) topography, with numerous sloughs and glacial stones and boulders.

The accompanying sketch map (Figure 9) illustrates the main physical features and surface deposits of the area.



LEGEND

1. Recent alluvial and pond deposits, flat to depressional topography
2. Alluvial sandy clay loams to gravelly loams, undulating topography
3. Marginal lake sands and sandy loams, partly re-worked by wind, undulating to rolling (dune) topography
4. Marginal lake sandy loams to silty loams, underlain by glacial till, undulating topography, some gently rolling
5. Glacial lake clays, level to undulating topography
6. Glacial till loams and clay loams, moraine undulating, rolling and hilly topography
7. Sand dunes
8. Flat to depressional, poorly drained area
9. Approximate location of archaeological site S.61
10. 1950' Elevation in feet above sea level

FIGURE 9

Sketch Map of Mortlach Area, Showing Surface Deposits

Both the glacial lake plain and the morainic upland are underlain by Cretaceous bedrock. The lake plain and part of the upland are underlain by marine deposits of the Bearpaw Formation. Other sections of the upland are underlain by younger marine formations (Eastend) and non-marine formations (Whitemud, Frenchman).

In the present study the glacial lake plain is the most important feature of the area. The lake marginal deposits, particularly those of sandy texture, have been modified by wind action. This led to the formation of sand dunes—chiefly at an earlier period. In addition, considerable wind erosion occurred in the dry period of 1930-1939, and this affected not only sandy soils but silty and light clayey soils as well. This is shown by numerous hummocks of drift and depressions or blow-pits in cultivated areas, and the recurrence of active erosion in some of the sand dunes.

The archaeological studies have been made along Sandy Creek, which rises in the morainic upland south of Mortlach and flows first north, then slightly north of east to join the Thunder Creek channel northwest of Caron. The present study was made at Site S61, in the southeast quarter of section 29, township 17, range 29, west of the second meridian, about four and one-half miles east of Mortlach. Here the creek channel is about forty feet deep and roughly 300 feet wide.

It would appear that Sandy Creek, in cutting through the lake marginal sandy deposits, has partly exposed the sites of early human settlement. The lower section of the creek would seem, therefore, to represent the erosion of the former lake or delta deposits, whereas near Mortlach the creek is merely a shallow, intermittent stream draining a series of depressions. It is not clear from the present study whether part of Sandy Creek belongs to the glacial drainage system represented by the Thunder Creek channel, or whether it is all a later development. This point is obviously of great importance to the interpretation of the archaeological sites.

A study of the glacial history of the area suggests that the lake-marginal deposits were laid down during the early stage of the formation of glacial Lake Regina. It is thought that this stage occurred when the margin of the ice sheet lay just north of what is now Thunder Creek. (Pelican Lake represents a depression within the Thunder Creek channel.) It is also thought that this channel represents a glacial spillway connected with the Saskatchewan River channel; this channel was cut by waters from the melting ice and from glacial lakes near Beechy and the Matador area, which flowed into the Regina Plain. This early stage of glacial Lake Regina involved the deposition of silts, sands, and coarser materials from elevations below 1,950 feet up to about 2,000 feet. These deposits are included in the lake-marginal and deltaic deposits shown on the sketch map as deposits numbers 1, 2, 3, and 4.

The present picture of the Mortlach area is given in the soil survey reports. The archaeological sites are adjacent to the boundary between the brown soils of the semi-arid prairie to the southwest and the dark brown soils of the less arid prairie to the northeast. Thus the clay soils of the Regina Association, occurring north of Caron, are classified as dark brown soils. The Hatton fine sandy loams around Mortlach are classified as brown soils. The soils of the Coteau upland, developed on glacial till, belong to the Haverhill Association of the brown soil zone, with local areas of dark brown (Weyburn) soils on the higher elevations.

The native vegetation of the study area consists chiefly of prairie grasses. Small clumps of scrubby trees and brush occur in sheltered locations along creek banks or in upland gullies, and in dune sands where the water table is close to the surface. Trees are absent from the Regina clay soils.

The development of agriculture in the area is related to the soil and topographic conditions. The best agricultural land is found on the nearly level Regina plain, where the drought-resistant clay soils and the smooth topography favour large-scale wheat farming. The better types of sandy loam soils are also cultivated, as are the smoother areas of loamy soils on the Coteau. There is a greater tendency toward "mixed farming on these soils particularly on the sandy loams, with more livestock and forage crops than are seen on the Regina clay. The dune sand and the saline creek bottoms are used as pasture. It is fortunate that the archaeological sites are situated on the non-arable soils, so that their study and preservation do not involve dealing with valuable agricultural land.

SOILS OF ARCHAEOLOGICAL SITE S61

PROJECT 1C

Project 1C is (fold in chart) situated on the south bank of Sandy Creek, in the location already indicated. At this point the creek is in a small ravine about forty feet to fifty feet deep. (All elevations mentioned are approximate only, since they were determined by aneroid-barometer readings.) The south bank of the creek is steep (nineteen per cent to twenty-five per cent slopes) but the north side is composed of sand dunes and it is difficult to identify corresponding creek banks on that side. Above the bank on the south side, is a nearly level terrace-like area of sandy loam, which starts near the site and extends for over two miles. A rough compass bearing gives the direction of this area as north seventy-five degrees east. The sandy loam grades eastward into silty loam and finally to clay loam near Caron. The surrounding areas are of rougher topography and consist largely of wind-blown (dune) sands.

The approximate elevation on the terrace-like area above the archaeological site is 1,940 feet. The bottom of the excavation is about forty feet lower. The steep north-facing slope into which the excavation extends has a mixed cover of aspen, willow, Manitoba maple, chokecherry, saskatoon, and grasses.

In sampling the south wall of this excavation, use was made of the excellent boundaries established by the archaeologists and shown both on the wall and on a printed diagram. The soil-sample numbers are correlated with the zone numbers and letters used in the archaeological work.

In the field examination of the south wall, it appeared that considerable disturbance may have occurred above zone 2. Such disturbance may have been caused by colluvial action (soil creep) whereby some of the material from above slid down the slope and was mixed with the lower soil. On the other hand, the material above zone 2 may represent sorting action during the deposition of the sediments. Zones 1 (A and B), 4A, 4C, 4E, were relatively dark coloured and looked like surface or A horizons of separate soil profiles. Zones 4D, 5A looked like sub-surface or B horizons, zone 5B looked like a horizon of lime carbonate accumulation, and zones 7 and 8 looked like

lower (B-C) and parent material (C) horizons. The lowest level (zone 9) consisted of a wet, very poorly drained clay, representing a sharp break from the sandy material above. It was also noted that below 4E the material showed some evidence of stratification or horizontal bedding.

Discontinuous layers of small stone and gravel occurred in zones 4B and 4C. Plant roots were observed in all zones down to zone 8. Animal burrows occurred in zones 4D, 4E, 5A, 7 and 8.

In presenting the results of the examination and analysis of the soils, the samples are grouped according to the apparent sequence of soil profiles shown by the excavation. Thus the present surface soil at the site includes samples 401 to 404; samples 405 to 408 appear to represent a buried soil profile; samples 409 to 413 appear to represent a second buried profile; sample 414 represents a different geological deposit of D horizon underlying the second buried profile.

In addition to the chemical analysis shown, determinations of conductivity and of water-soluble sodium and calcium ions were also made. Conductivity values were very low throughout, indicating that only very small amounts of soluble salts are present. Soluble calcium exceeded soluble sodium in all samples except 405, in which there were one hundred p.p.m. soluble sodium and fifty p.p.m. soluble calcium. However, with such low values this difference is not important.

In describing the various soils, references are made to soil horizons, structure, colours, etc. These terms are used by soil surveyors and many of them are defined in Soil Survey Report No. 12. The A horizon represents the surface layer of the soil that usually contains the greatest amount of soil organic matter or humus. The B horizons represent sub-surface and sub-soil layers that are altered by soil forming processes. The C horizon represents the slightly altered to unaltered parent material from which the overlying soil has developed. The D horizon represents a different geological deposit from that represented by the A and B horizons. Cloddy, nutty and granular structures represent soil aggregates of roughly cubical form, but of different sizes; cloddy aggregates range from 0.5 inches to 2.0 inches or more in diameter, whereas granular aggregates range from about 0.2 inches to less than 0.1 inches in diameter.

Brief descriptions of the soils are given below, together with the laboratory results. A. K. Ballantyne carried out the chemical analysis, and W. K. Janzen made the mechanical analysis.

UPPER PROFILE

(Present Surface)

(Zones 1 to 2)

Sample 401; Zone 1A; Depth, 0 inches to 4 inches: Surface A horizon, disturbed. Nearly black fine sandy loam; granular structure, soft, easily crushed; no free lime-carbonate. High in organic matter.

Sample 402; Zone 1B; Depth, 4 inches to 8 inches: Lower A horizon. Dark greyish-brown fine sandy loam; cloddy-granular structure; firm-crushing with moderate pressure; no free lime-carbonate.

Sample 403 (clay with sand); Depth, 8 inches to 14 inches: B or D horizon. Yellow-brown heavy fine sandy loam; massive, breaking to large cloddy structures; very firm to hard—considerable pressure required to crush aggregates; no lime-carbonate.

Sample 404; Zone 2; Depth, 14 inches to 22 inches: B horizon. Grey-brown loamy coarse sandy; nutty to granular structure, firm; no lime-carbonate

Analysis of Upper Profile

Sample	*pH*	*Nitrogen per cent*	*Inorganic Carbon per cent*
401	7.2	0.71	0.17
402	7.2	0.24	....
403	7.1	0.08	....
404	7.1	0.09	....

SECOND PROFILE
(Zones 4A to 4D)

Sample 405; Zone 4A; Depth, 23 inches to 26 inches: A horizon. Very dark grey, fine sandy loam; cloddy-granular structure, firm; no lime-carbonate.

Sample 406; Zone 4B; Depth, 27 inches to 33 inches: A horizon. Dark grey-brown, fine sandy loam; cloddy granular structure, firm to very firm—crushing with moderate to considerable pressure; no lime carbonate.

Sample 407; Zone 4C; Depth, 40 inches to 46 inches: A horizon, taken west of and a little lower than 406. Dark grey, fine sandy loam; cloddy granular structure, firm to very firm; no lime carbonate.

Sample 408; Zone 4D; Depth, 34 inches to 42 inches: B horizon. Medium greyish-brown, fine sandy loam; cloddy granular structure, very firm; no lime carbonate.

Analysis of Second Profile

Sample	*pH*	*Nitrogen per cent*	*Inorganic Carbon per cent*
405	7.2	0.21	Trace
406	7.2	0.21	....
407	7.3	0.16	....
408	6.8	0.09	....

THIRD PROFILE
(Zones 4E to 9)

Sample 409; Zone 4E; Depth, 44 inches to 48 inches: A horizon. Dark greyish-brown, fine sandy loam; massive, hard, requiring great pressure to break into smaller aggregates; no lime carbonate.

Sample 410; Zone 5A; Depth, 50 inches to 56 inches: B horizon. Light olive-grey loamy sand; massive, hard, as above; none to slight lime carbonate content, as indicated by effervescence of soil in dilute hydrochloric acid.

Sample 411; Zone 5B; Depth, 60 inches to 65 inches: B(ca) horizon. Mixed olive-grey, dark grey, loamy fine sand; massive, firm, crushing with moderate pressure to granular and loose, structureless condition; high lime carbonate content shown by strong effervescence in hydrochloric acid.

Sample 412; Zone 7; Depth, 67 inches to 72 inches: B_3 or B-C horizon. Light grey loamy sand; massive, soft-crushing easily to loose structureless condition; none to moderate content of lime carbonate.

Sample 413; Zone 8; Depth, 74 inches to 84 inches: C horizon. Pale yellow coarse sand; loose, structureless; none to slight lime carbonate content.

Sample 414; Zone 9; Depth, 85 inches: D horizon. Mottled olive-grey, light grey, yellow, rusty clay; massive, hard; moderate lime carbonate content; wet, very poorly drained.

Analysis of Third Profile

Sample	*pH*	*Nitrogen per cent*	*Inorganic Carbon per cent*
409	7.0	0.14	....
410	7.5	0.02	0.09
411	8.1	0.02	1.44
412	8.2	....	0.12
413	8.1	0.01	0.09
414	7.7	0.03	1.34

SAMPLES FROM WEST WALL (Zones 8 and 9)

Sample 415; Zone 8; Depth, about 72 inches to 84 inches: Mottled bands of yellowish, rusty, bluish-grey sands; loose, structureless; none to slight lime carbonate content. Compare with Sample 413.

Sample 416; Zone 9; Depth, about 84 inches to 96 inches: Mottled grey, greyish-brown, yellowish clay; massive, hard; slight lime carbonate content. Compare with Sample 414.

Analysis of Samples from West Wall

Sample	*pH*	*Nitrogen per cent*	*Inorganic Carbon per cent*
415	7.5	0.07	0.04
416	7.7	0.05	0.07

PROFILE FROM LEVEL UPLAND ABOVE CREEK BANK

Sample 417; Depth, 0 inches to 12 inches: A horizon. Dark greyish-brown, fine sandy loam; cloddy granular structure, firm, crushing with moderate pressure; no lime carbonate.

Sample 418; Depth, 12 inches to 24 inches: B horizon. Yellowish-brown fine sandy loam; weak columnar structure, breaking to nutty and granular aggregates, firm; no lime carbonate.

Analysis of Profile from Level Upland

Sample	*pH*	*Nitrogen per cent*	*Inorganic Carbon per cent*
417	6.4	0.14	....
418	7.4	0.05	....

MECHANICAL ANALYSIS OF SELECTED SAMPLES

Sample	Zone	Total Sand 2.0-0.5 mm.	Coarse to Medium Sand 2.0-.25 mm.	Fine Sand .25-.10 mm.	Very Fine Sand .10-.05 mm.	Total Silt .05-.002 mm.	Total Clay .002 mm.	Texture
402	1B	75.06	24.40	27.59	23.07	11.87	13.10	FSL
404	2	84.22	29.25	35.89	19.08	7.75	7.86	LS
406	4B	74.57	20.85	29.94	23.78	12.48	12.96	FSL
408	4D	72.14	18.40	29.14	24.60	14.52	13.36	FSL
409	4E	71.82	22.85	25.46	23.51	13.64	14.54	FSL
410	5A	86.94	29.09	39.78	18.07	5.62	7.44	LS
411	5B	81.31	10.98	40.51	29.82	8.24	10.46	LFS
412	7	93.77	45.77	40.04	7.98	2.50	3.73	CS

DISCUSSION OF SOIL SAMPLES

The nitrogen content of the present surface soil at the site (zone 1A) is 0.71 per cent. This is far higher than the nitrogen content of 0.15 per cent to 0.20 per cent found in surface horizons of sandy loam soils of southwest Saskatchewan. The high nitrogen content of sample 401 may be due in part to the sheltered northern slope on which the upper profile occurs. This situation would provide better-than-average soil moisture conditions, which would favour a good stand of native grasses; these in turn would supply more organic matter and nitrogen to the soil. It is also possible that zone 1A contains other sources of nitrogen, associated with the use of the site for human settlement.

As indicated by the description, sample 401 was very dark coloured—almost black, suggesting a high content of humus. The high nitrogen value supports the field observations since in most soils the contents of soil nitrogen and soil organic matter are directly related. Studies by F. W. Schroer[4] indicate that for surface horizons of Saskatchewan soils, a figure of twenty times the percentage of nitrogen gives a reasonably close approximation of the content of soil organic matter.

The nitrogen content of sample 402 suggests that this is also part of the A horizon; the much lower values for samples 403 and 404 suggest that these are subsoil or B horizons. These differences in nitrogen content also correspond to the differences in the colours of the soil horizons—darker colours being associated with higher nitrogen values. The same may be said of the results for the second profile (samples 405 and 408). It should be noted that sample 407 appears to represent a buried surface or A horizon taken outside of the vertical profile represented by samples 405, 406 and 408. Sample 407 was taken in Zone 4C, which does not extend the full width of the excavation.

In the third profile, sample 409 appears to represent another buried surface or A horizon while samples 410-413 represent subsoil (B) and parent material (C) horizons. Sample 414 represents a different geological deposit or D horizon, as indicated by its clay texture—the horizons above being sandy textured.

The pH values of the three profiles represent neutral to moderately alkaline reactions indicating that the soils are not severely leached. The highest pH and inorganic carbon values occur in the third profile, which is also the

only profile to contain free lime-carbonates (calcium and magnesium carbonates), The higher inorganic carbon values correspond to higher lime carbonate contents as indicated by effervescence of the soil in dilute hydrochloric acid.

Samples 415 and 416 were taken from the west wall at the request of Mr. Wettlaufer. It would appear that these samples represent cultural horizons in zones 8 and 9. There is little difference between samples 415 and 416 and samples 413 and 414. Samples 415 and 416 are slightly higher in nitrogen and therefore presumably, in organic matter also, but the differences are very small.

Samples 417 and 418 represent the present soils on the nearly level, terrace-like area above the creek bank. This is a well drained position, and as indicated by the pH values, the surface horizon (sample 417) is slightly acid. The nitrogen value of this horizon is what may be expected for a virgin sandy loam of the brown soil zone.

The mechanical analysis of selected samples indicate that all soil horizons above zone 9 are coarse textured, ranging from coarse sand to fine sandy loam. Taking the samples as a whole, the sandy fraction consists of fifty per cent to fifty-eight per cent of very fine and fine sands, and twenty-one per cent to twenty-nine per cent of medium to very coarse sands. Exceptions to this general pattern are seen in sample 411 where the finer sands predominate and in sample 412 which contains forty-five per cent of medium and coarse sands. The total sands range from seventy-two per cent to over ninety-three per cent of the total mineral fraction. The content of silt and clay ranges from about six per cent in the coarse sand texture (sample 412) to about twenty-eight per cent in the fine sandy loams. These variations in mechanical composition suggest differences in the nature of the original deposits or differences in their manner of deposition.

By way of comparison, the mechanical composition of wind-blown fine sand is given below:

Sample	*Total Sand*	*Coarse to Medium Sand*	*Fine Sand*	*Very Fine Sand*	*Silt*	*Clay*
Moose Jaw.....	82.7	1.8	31.2	49.7	7.6	9.7
Swift Current.....	85.2	11.3	32.7	41.2	7.0	6.0

It will be noticed that the dune sand contain more very fine sand and less medium to coarse sand than the Mortlach samples. Sample 411 is the only Mortlach sample that approaches the composition of the dune sands, and by this comparison could be of wind-blown origin. The remainder of the Mortlach samples appear to contain too much coarse sand, too little very fine sand, and in the heavier textured soils, too much silt and clay to be representative of dune sands. They may represent water deposited materials from which dune sands are developed by subsequent wind action.

CONCLUSIONS

The following tentative conclusions are based on a discussion with Professor F. H. Edmunds:

It is considered that the bulk of the marginal lake deposits (deposits 3 and 4, Figure 9) must have been laid down by Thunder Creek when it was an active glacial drainage channel. The area drained by Sandy Creek is too small to account for more than local deposition. Furthermore, the source of Sandy Creek is in the medium to heavy textured deposits of the Missouri

Coteau; it does not seem possible therefore, that the large area of predominantly sandy material occurring along the lower reaches of the creek could have come from the Coteau upland.

It is suggested therefore, that the Sandy Creek channel was excavated subsequent to the deposition of the marginal deposits of glacial Lake Regina. The development of Sandy Creek could have taken place under more humid conditions than those now prevailing—while the area was still influenced by the Pleistocene climate.

With respect to human settlement, the oldest dating of approximately 3,400 years at the Mortlach site would be regarded as being much younger than the development of glacial Lake Regina.

The succession of soil profiles at the site suggests periods of soil stability, while soil formation was proceeding, followed by deposition of sediments which buried the original soil. Ultimately a new soil profile developed in the deposits overlying the earlier soil. The deposition which buried the lower soils may have come from the movement of materials from above, under the influence of gravity. Some material may have come from wind deposition although as already stated, only one layer (sample 411) approaches the mechanical composition of wind-blown sands.

Part III

SUMMARY AND CONCLUSIONS

DATING BY CARBON

The University of Saskatchewan has been doing Carbon-14 dating since late in 1953. Dr. K. J. McCallum is in charge of the project and he is responsible for obtaining the carbon dates given in this report. The very first of these dates was 3400 plus-minus 200 years obtained from the breaking down of bone material obtained from the Thunder Creek culture during the test excavation of 1952. Because bone material is subject to contamination by carbon dioxide carried in the ground water, Dr. McCallum did not wish the author to use this date. He gave permission only if this possible contamination was explained.

In spite of Dr. McCallum's well-founded fears this seems to be a logical date for the culture. The material is quite similar to that found by Bliss in Signal Butte, Level 1, in western Nebraska. The Signal Butte material had an average date of 1500 B.C. (Kulp, Feely and Tryon, 1951, page 566). The projectile points from this earliest cultural level (Thunder Creek) were compared with the Richard P. Wheeler's Duncan and McKean points of the Angustura basin and found to be similar (Eleventh Plains Archaeological Conference, Lincoln, Nebraska, November 26-28, 1953). These also have a carbon date of approximately 1500 B.C. According to climatic dating (see next heading) this culture fits nicely into the first moist stage of the Medithermal temperature age. Further to this, the Thunder Creek material is found in a coarse ocherous sand directly on top of a thick bed of clay. This clay would prevent any upward movement of ground water, so the only possible ground water that could contaminate the bones used for dating would be water containing carbon dioxide obtained from more recent horizons. Therefore, any error in time resulting from this contamination would be an error in the "late" direction. The date given of 3,400 years should be considered as a minimal date on this cultural horizon.

In the case of the other two levels date, the next earliest—2400 plus-minus 290—was obtained from charcoal mixed with soil in a well defined ash zone in the 4E zone or Sandy Creek cultural level. This is less likely to be contaminated and is probably fairly accurate. The top one—1580 plus-minus 325—was taken on bone material, but due to its height in the column and the fact that several rather impervious caliche layers underlie it, the date is probably quite accurate. Both of these dates also compare quite well with climatic dates in the Plains region (see following heading). Indeed, the very good comparisons of all three of these levels with other carbon-dated material speaks well for the care and thoroughness of Dr. McCallum and his staff. In the light of the present dates it is possible that a carbon-14 test could be run on levels 4A and 3. Material could possibly be obtained from level 4A, but level 3 is so poorly represented that it is doubtful if enough carbon or even bone could be obtained for a date. It would be useful to have a date on 4A, however. The material is similar enough to 4B (which has a C-14 date of 1580 plus-minus 325), that an estimated date should at least fall within the margin of error. The same holds good for the later levels. Estimated dates, using history at one end and 4B dating at the

other, will probably be very nearly as accurate as the dates established by C-14 tests (Figure 11). The process is expensive and time consuming, and with three well spaced dates already established, one would hesitate to submit further material for testing from this site. A wiser use of the services of Dr. McCallum and his staff would be to run Carbon-14 tests on other sites containing similar cultural material, particularly levels with a definite cultural change such as the Sandy Creek culture (5A).

DATING BY CLIMATE

Geology

In reviewing the stratigraphy of the Mortlach site several outstanding factors become apparent:

1. The cultural-bearing layers rest upon an irregular clay surface. This clay, according to the Soil's Report, suggests a deep water deposit and is probably associated with the closing phases of the glacial Lake Regina.

2. The Soil's analysis further brought out the fact that only in one level was there any indication of Aeolian deposits. The remaining stratigraphic column, therefore, is primarily composed of water-deposit material through which soil zones and cultural deposits are distributed.

3. These soil zones consist in almost every instance of a well established "A" zone overlying a fair to well developed "B" zone.

4. In almost every instance the cultural material is associated with the "A" zones of the buried soils profiles.

5. Carbon dates for the site were derived from material associated with the cultural levels, i.e., the "A" zones.

6. Only the very lowest cultural layers show any indication of reworking by stream action.

7. The location of the site relative to the Sandy Creek drainage system is that of a terminal to near-terminal stream deposit.

Considering the above factors as related to each other and to the stratigraphic cross-section, it seems logical to assume that during the closing phases of glacial Lake Regina an arm of the lake extended backward filling the Thunder Creek-Pelican Lake-Sandy Creek drainage system to a depth of many feet. During this period the clay zone was laid down. As the shore line of the glacial lake retreated, this arm of the lake may have been left as a remnant. There is some indication of this in the spreading out of the Thunder Creek Valley, a few miles west of the city of Moose Jaw. Remnant beaches may be found in this vicinity as well as glacial moraines. However, further work *is indicated* by a competent pleistocene geologist to establish the importance of these geologic features to the archaeological picture. As the ice retreated further north this system no longer remained a lake, as evidenced by the sorted sands directly overlying the clay base. It is possible that the release of pressure over the Mortlach area may have caused a slight rising or up-lift, thus tilting the system sufficiently to cause the lake to break through and drain. This would seem logical because the Missouri Couteau lies approximately six to eight miles due south of Sandy Creek. The weight of the ice shoved up against the face of the Couteau must have been considerably greater than on the areas to the west where no such obstruction presented itself. Thus the up-lift in this vicinity would more than likely be greater than that of the Regina Lake floor. This may, however, have not been sufficiently greater to completely drain the Thunder Creek system.

Climate

Probably the more important factor in this case would be the great drought of the Medithermal climatic period. According to Dr. Antevs this great drought period extended in time from 7500 to 4000 B.P. (Geological Climatic Dating in the West by Ernest Antevs, American Antiquity Journal 20, No. 4, April, 1955, Figure 93, page 329). That this great drought period was responsible for the final dry-up of the Sandy Creek portion of the Thunder Creek drainage system is evidenced by the fact that the sand overlying the basic clay contained artifacts and datable carbon material which gave a C-14 date of 3400 plus-minus 250 years. This would indicate that very little time elapsed between the deposition of the final clay and the establishment of habitation in the valley bottom formerly occupied by the lake. Another pertinent factor is the unevenness of the clay floor. This floor is pock marked with small depressions which may well be animal tracks. The drying up of the lake which was a source of water for animals in the vicinity would naturally result in this type of action. If we are to assume that this interpretation is correct then, as the lake dried up and the drought became more and more severe, the water table of the valley system would drop and nothing would be left of the lake bottom but dried and cracked clay. As the climate changed, and the water table rose, a trickle of moisture would start to run through in the direction of Moose Jaw, as the tilt of the system (due to up-lift) is in that direction. At first this stream would fill the lower depressions in the valley floor and simply run from one depression to the next. As the water table became higher and more water found its way into the system this trickle would cut itself a shallow channel into the clay floor of the valley. Such a channel is in evidence a few feet to the north of Project 1C and the tilting of the beds throughout the project is in the direction of this channel. It may be noted at the same time that the contours of the beds reflect the contour of the clay floor. They then dip steeply into the old channel bottom. As the parched soil once more became soaked with water and more and more of this water found its way into Sandy Creek, the stream would seek a more direct route than that first established and would assume the pattern of a new stream and begin aggrading the valley deposits. For some period of time material from up stream would be carried down and deposited in this lower valley area. It is well to bear in mind at this time that the portion of the valley in which the site is located is near the junction of the Sandy Creek system with that of the major drainage, i.e., Thunder Creek. During the flood periods or in the early spring run-off this stream would overflow its banks and deposit sand and silt from the upper part of the valley over the valley floor. These seasonal slack water deposits constitute the lower sand zones of Project 1. There may well have been slight occurrences of drought conditions during these cycles of deposits, as there are caliche remnants in two different places within these lower sands. A certain amount of reworking is also evidenced in the unevenness of the sand deposits, particularly in the lower foot or foot and one-half. This is understandable since the stream is a new one and therefore has a shallow bed, and the surrounding area may not have had too verdant a vegetation after so many hundreds of years of drought. This combination of quick run-off and shallow bed would result in consistent flooding of the valley bottom and the carry-over of a relatively coarse deposit of sand as well as slack water deposits of the finer silts. The next fluctuation of the stream may well have been a relatively violent one, reworking the previous deposits while covering them with a new layer of sand and silt.

Early in this cycle of deposition, and before the stream action became too violent, the people of the Thunder Creek culture stopped for a period of time in the valley bottom and left behind them the evidences of their passing. These were quickly buried by the stream and for the next thousand years people stopped occasionally at this location or near its vicinity. However, by this time the stream was very active and nothing but scattered artifacts are to be found to indicate that people had been there.

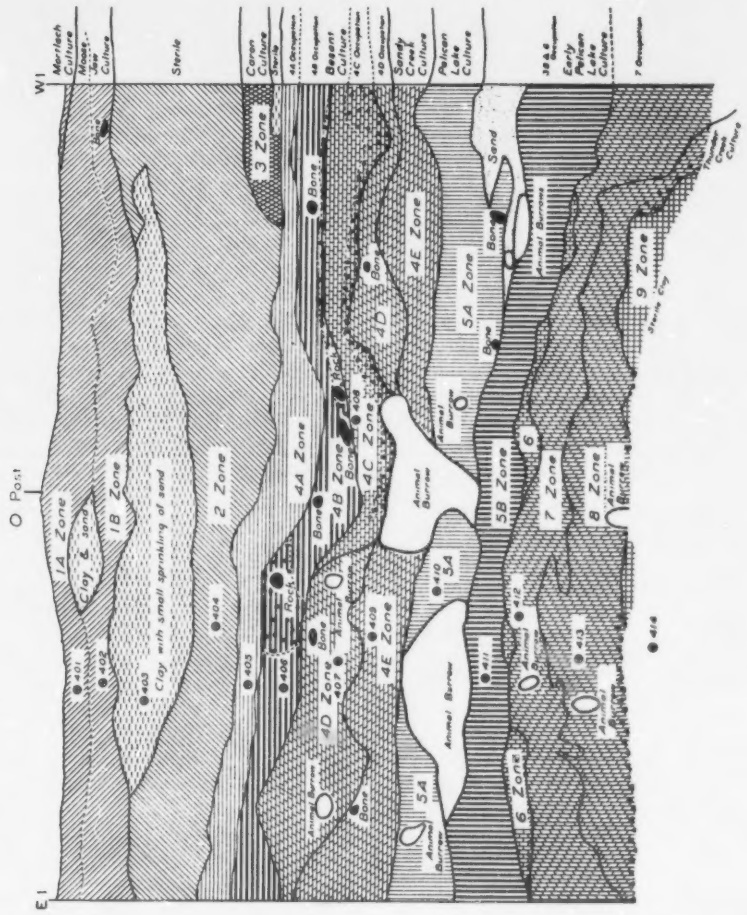


FIGURE 10
Correlation of Soil Zones and Cultural Levels

Now came a period of drought. The water table dropped, the stream slowed to a trickle and no longer overflowed its banks, the surrounding area dried up but sufficient moisture remained in the valley bottom (held by the

sand deposits) to support vegetation. During this period of quiescence on the part of the stream a soil zone was formed. In this soil zone we once more find evidence of the existence of man. Undoubtedly with the drying up of the surrounding area the game would seek the valley bottoms for lush grass to sustain life. Man too, would camp in the valleys, as only here could he find water and game. This major soil zone is 4E on the stratigraphic map.

This lack of water is somewhat peculiar to the country since the area is one of knob and kettle terrain, and during wet periods water could be obtained throughout this region. However, with the coming of drought conditions those portions which did not dry up would become so strongly alkaline as to be unfit for human consumption and the surrounding area would no longer support grass due to this high concentration of salts. Therefore, only the major drainage systems could support life, and natives of these times would be forced to make long journeys from one drainage system to the next. With the return of more humid conditions once more the plains would become green, the pot holes would fill up, the game would range widely throughout the territory and there would be no necessity to live within the confines of the valley bottoms.

As a matter of fact, with the coming of wet conditions, the Sandy Creek Valley became less habitable due to the recurrence of flood plain conditions blanketing the vegetation (and the evidence of human occupation) under layers of silt. One of the outstanding soil layers buried during a humid condition is that recorded as zone 4E on the chart and occupied by the Pelican Lake people. This zone has been dated by C-14 at 2400 plus-minus 290. In all likelihood, this corresponds to the Fairbank drought which was dated by radiocarbon at 500 B.C. (see page 330, Antevs). Although a difference of fifty-five years exists between the carbon date on the Fairbank drought and that of the Pelican Lake culture, it must be remembered that a number of years of drought conditions would have to take place before it became necessary for man to seek the sanctuary of the valley bottom. The carbon date was run on material obtained in association with the cultural material belonging to this level and therefore reports the time of habitation. One must also consider the plus-minus factor which is considerably greater than the difference between the two dates. Therefore, there seems little reasonable doubt but that the Sandy Creek Valley was occupied by Pelican Lake people during the Fairbank Drought. A glance at the chart in Figure 10 will show that this cycle of deposition, separated by a soil zone containing cultural material and followed again by stream deposition, repeats itself numerous times throughout the middle and upper levels of the stratigraphic column. The only difference seems to be that by now the stream has lost its savagery, and the deposits are typical slack water deposits of fine sands and silts, and show no evidence of reworking by stream action.

One more level of occupation was dated by Carbon-14—that is, the soil zone represented in 4B. This zone was chosen, as was the 4E zone, because of the large quantity of human artifacts and associated carbonaceous material, undoubtedly indicating a longer than average habitation. The carbon-14 date for this level is 1580 plus-minus 325, which gives us a date of 375 A.D. Undoubtedly this corresponds with the White Water Drought of the Sulphur Springs Valley, (page 330, Antevs). The same conditions regarding dating would apply as previously stated, and it seems more than coincidence that the margin of differences in both of these cases is approximately the same. It is

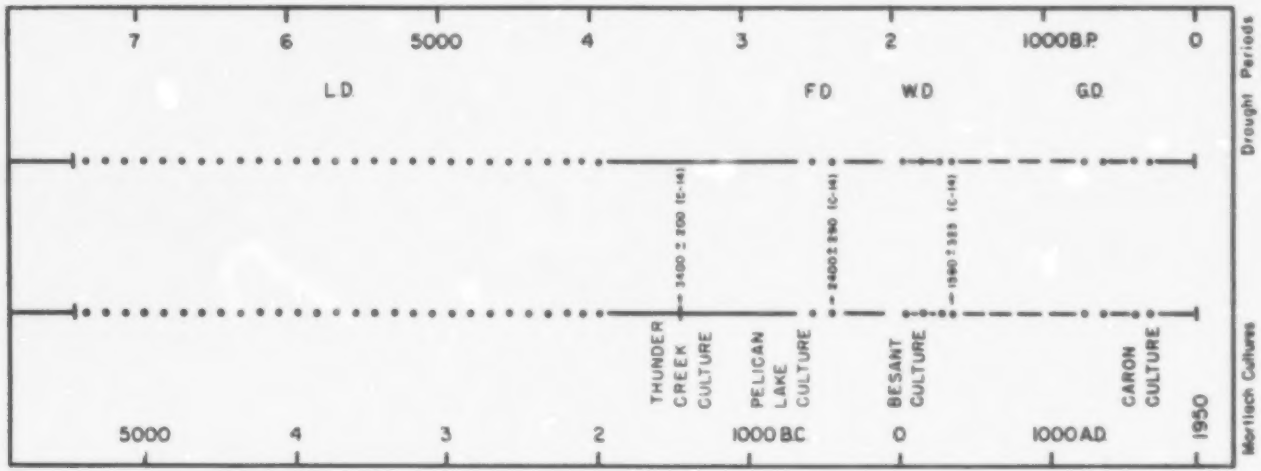


FIGURE 11
Comparison of Cultural and Climatic Zones of Medithermal Time

Droughts (dots) and comparitively moist ages in the west during the Alti- and Medithermal. The decreasing length of the lines suggests the decrease in moisture. L.D. stands for the Long Drought, F.D. for the Fairbank Drought, W.D. for the Whitewater Drought, and G.D. for the Great Drought (Antevs). Cultures appear in the Mortlach site partway through drought periods, therefore Besant 4C and 4D probably correspond to droughts of 162 A.D.-181 A.D. and 12 A.D.-60 A.D. respectively. Besant occupation 4A corresponds to the Great Drought of 1276 A.D.-1299 A.D. Similarly Caron may be compared with the drought of 1573 A.D. to 1593 A.D.

unfortunate that carbon dates were not acquired for the other levels of occupation. However, the pattern is set, and it would seem feasible to associate these other levels with other periods of drought in the northern Plains region.

There is one very well-established zone directly overlying the 1580 B.P. level. This cultural zone contains evidence of a house type, and may well represent the Great Drought of 1276-1299. Above this level the separation into A and B zones becomes very apparent, and according to the soils analysis these upper levels represent a modern soils complex. Certainly the stream ceased to play as important a part in the depositional cycles. This is more than likely due to the aggrading action of the stream passing into old age, and to the thickness of deposits which would prohibit to a great extent extensive flood plain or slack water conditions. Another factor that may well have entered into the picture is that, during the initial and intermediate stages in the development of this stratigraphic column, there must have been continuous uplift readjusting the gradient of the stream and rejuvenating it. Around the period of the Great Drought this uplift gradually ceased, and the stream at present is a meandering stream in the old-age stage.

This rather unique stratigraphic sequence has given us, beyond a doubt, a clue to at least two more drought periods lying between the Fairbank Drought and the White Water Drought. These are represented by zones 4C and 4D. If the thickness of the deposits has any meaning, these two drought zones occurred somewhat nearer in time to the White Water Drought than the Fairbank Drought, since zones 4C and 4D are closer in the stratigraphic column to 4B than to 4E. In looking over Dr. Antev's compilation of data on droughts on page 330 of his report, "Geological-Climatic Dating in the West," one finds that he refers to two interrupted droughts indicated by tree rings in northeastern Arizona, which Dr. Edmund Schulman dates at A.D. 12 to 60 and A.D. 162 to 181 respectively. These may well correspond to the two zones indicated above. At least these two dates could be assigned as approximate until further evidence can be found to corroborate them. In assigning estimated dates to cultural horizons on the basis of climate, consideration has been given to the fact that, as a refugee site, Mortlach would probably not be occupied until several years after the beginning of each drought period. Thus, a compromise must be made between the initial and terminal dates of the droughts (see Figure 11). It is doubtful if sufficient carbon material can be obtained from these levels for a Carbon-14 date. However, further exploration in the pocket lakes and muskegs in Saskatchewan can and will establish climatic changes, and at the same time supply material for carbon dating. A chart is shown in Figure 11 of these wet and dry fluctuations as indicated by the stratigraphy.

REVIEW OF CULTURES

Taking a look at the cultural levels of Mortlach in a general way, it becomes obvious that no single occupational level represents habitation for a very long period of time. Some of the levels may even represent a single large hunt or kill. Mortlach was a stopping place where wood and water could be obtained while hunting. There is nothing to indicate a permanent village site. Even the post-holes in level 4A may only indicate that a small family group attempted to live through the winter in the valley to be on hand for the spring migration of the buffalo. The great Plains region with its open grasslands and semi-parkland borders is a natural for nomads. The buffalo wandered, and so

did the Indian. His was a simple hunting and food-gathering type of economy. When game became scarce he *must* move. His were the people of the Mortlach site—nomads from the earliest cultural level to last inhabitant with beaded jacket and white man's gun. It is little wonder, therefore, that the material culture of the various levels seems much the same. The tools had similar uses. The people lived similar lives. Often the major difference between two cultures is their position in the stratigraphic column.

Mortlach is a *stratified* site. In this fact lies the major importance to the archaeological field. The Plains region has hundreds of locations where the action of the wind has uncovered material culture ranging from the throwing spear of early man to the gun flint of the white man. All too often these extremes in time are lying side by side with nothing to indicate the large expanse of time that lies between them. Mortlach gives us this time span, and gives us a little knowledge of the people who have lived throughout this time span in the Besant Valley.

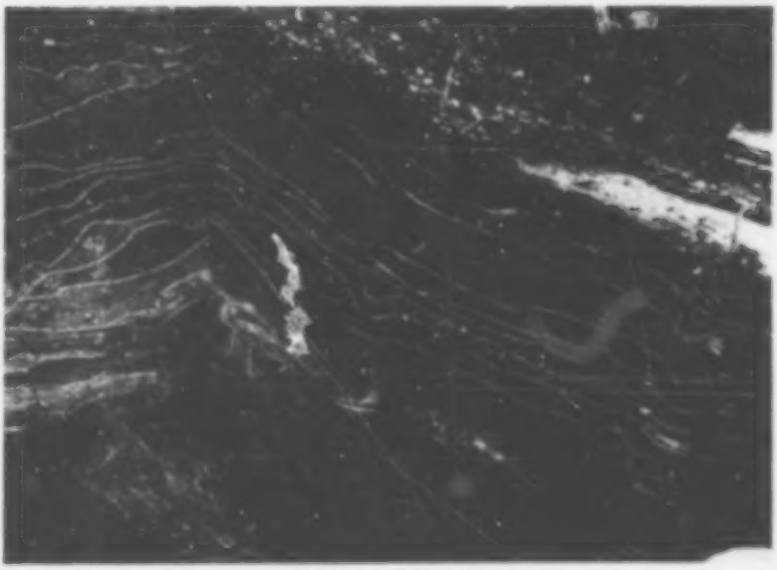


ILLUSTRATION 11
Stratigraphy of West Wall—Project 1C

The earliest inhabitants, the "Thunder Creek Culture," represent the first possible living in the valley. A meandering trickle stream supplied their needs, so they stopped for a while beside it, and lived off the spoils of the hunt. They tanned hides here where water could be used in the process, and they left behind the crude tools they used. These tools are so similar to those found in northern United States, that we feel reasonably certain that these are either the same people or different bands of the same major tribe. Compare the projectile points in Plates 13 and 14 with the projectile points illustrated in Figure 1, page twelve, of an article by Richard Page Wheeler, "Two New Projectile Point Types: Duncan and Hanna Points," in the May, 1954, issue

of the *Plains Anthropologist*, and you will see the marked similarity. On page seven Mr. Wheeler devotes two paragraphs to locations where these points have been found. Among these he includes, "Signal Butte 1." The author has in his possession, photographs of material from the Signal Butte site in Nebraska. These photographs show several projectile points that are similar to both the Duncan points of Mr. Wheeler and the projectile points from the Thunder Creek cultural level. Couple this with the similarity in C-14 dates, as previously stated, and the cultural similarity would seem most significant. The Thunder Creek people would seem to be a northern extension of a group of people whose hunting territory extends from central Saskatchewan to at least Nebraska, and possibly farther. They may well represent a generalized culture used over the whole Plains region at this time level. Because this may be so, the author is not calling this level "Signal Butte," or calling the projectile points "Duncan" points, but leaving this first occupation as the "Thunder Creek Culture." It is possible that the Thunder Creek Culture projectile point might be favourably compared with "Pinto Basin" points and the "Pedernales Indented Base."

The next complex of cultures to be considered is scattered through approximately a thousand year period represented by the heavy sand deposits of Levels 5A to 7. This is represented culturally by the Pelican Lake people and has several characteristics that should make the culture recognizable out of context. These have been named before, but are, briefly: the use of a well-made, corner-tanged projectile point, a domed scraper and the use of chipped bone tools. These, unfortunately, do not help us in separating occupational levels of these people over the one thousand years of their existence in this area. The projectile point varies very little. It possibly reaches a high point of development in approximately the middle of this period, as characterized by the fineness of the workmanship. This, however, could have been merely the work of an exceptionally fine craftsman. The domed scraper is also a poor marker. Only its size might be used to aid in the time problem. The flaked bone tool seems to be significant. It appears only in level 7, but this does not necessarily mean that it doesn't exist in another level. Consequently, we must consider this thousand year time period as not divisible on the basis of the material found in this site. Further excavation on other sites containing this material is indicated.

Going upward in the stratigraphic column we come to level 4E. This is represented culturally by the Sandy Creek culture. This level is well separated stratigraphically from the Pelican Lake culture just below it. Flaked bone tools are characteristic of this culture as well, but these differ somewhat from those of the ancestral Pelican Lake type. A glance at the plates corresponding to the two levels will show this. The major difference in the cultures, however, is the projectile points. These have shallow, open, side notches and incurved rather than indented bases. Their plano-convex style and crude thick shape set them aside from the shallow notched points of the Besant culture above. The most interesting tool is the sewing awl. This has been covered in detail previously and certainly illustrates the ingenuity of man. Projectile points of the type belonging to this level are to be seen in almost every private collection throughout the province. The author has seen many of these specimens in Manitoba as well. Undoubtedly this culture can be traced in the future over a still wider area. The Carbon-14 date of 2400 plus-minus 290 B.P. will be most useful in making these wider correlations.

Although the Besant culture has been made to include four occupational levels, the lower two of these deserve special notice. The point type characteristic of level 4D is one of the well known types of the Plains Region. These are locally called dog-ears and can be found throughout the three prairie provinces. They are very easily recognized out of context. It is interesting to note that the only other point of this type found in the site was in the late Moose Jaw culture and it was an isolated find. Further work is indicated on sites of this kind to establish the areal distribution and time span of this interesting culture.

The crude tool complex just above it is also worthy of note. True, not enough material has been found to establish a point type or a cultural complex, but it leaves us with some interesting questions. For example, is this a new culture or a later phase of the Pelican Lake culture?

Occupations 4A and 4B are undoubtedly by the same people and are distinctive. Little difficulty should be encountered in tracing the distribution of these people on the basis of their material culture. The carbon date of 1580 plus-minus 325, on the 4B level should be a big help in drawing comparisons and working out distribution.

FLAKE COUNT PROJECT 1B

Levels	1A	1B	2	3	4A	4B	4C	4D	4E	5A	6	7	8
Chalcedony	67	45	20	19	43	28	9	14	15	10	..	2	..
Pet Wood	27	24	5	14	37	41	13	15	12	13	..	5	7
Chert	20	10	3	6	6	4	3	4	4	7	..	4	5
Obsidian	2	..	..	..	..	..	..	1	..	..	..	..	..
Quartz (crystalline)	11	2	..	..	1	12	5	2	5	11	..	1	1
Quartzite	19	8	9	15	33	40	7	15	21	21	..	7	24
Crystalline Chert	92	76	31	19	54	162	32	99	47	63	..	..	26
Jasper	15	7	2	..	4	4	2	2	6	1	..	..	..
Agate	2	5	4	..	2	11	3	..	..	..	..	..	..
Glassy Andesite	..	1	..	..	..	..	..	..	..	..	..	..	..
Total	255	178	74	73	180	302	74	152	110	126	..	19	63

The Caron culture with its characteristic scraper type and projectile point should be easy to trace. It is a shame that the level is so poorly represented. At no other level in the excavation does either of these types appear. Therefore, the presence of both of them in a site should be sufficient evidence of the occupation of these people. Undoubtedly the excavation of a "key" site of this culture will give us a better knowledge of the Caron people.

The pottery horizons are sufficiently well established to require no further comment. The pottery itself offers the best means of correlating these cultural levels.

There is some evidence that the Mortlach people may not have been the last inhabitants of the valley. Mr. Allan Hudson, in 1953, dug out some material from the slope of the valley near the western end of the site that may be later than anything given in this publication. Unfortunately, by 1954 little was left undisturbed by the amateurs who concentrated on this portion of the site. Therefore, nothing was obtained to corroborate Mr. Hudson's findings. Still the condition of the bone in portions of the buffalo kill, coupled with the

well preserved condition of the horn and hair, suggest a very late occupation. This kill was completely destroyed by the amateur and these observations had to be made on the debris left by the arrow hunter.

Below is a table of cultures and dates of the Mortlach site as indicated by the excavations. The historic date of 1750 on the late Moose Jaw culture is based on the small amount of contact material found associated with this culture. Only two objects of white man's culture were found, very likely indicating trade rather than direct contact. After 1750 direct contact was almost assured. Before this date, although the French forts were established in Manitoba and Henry Kelsey the explorer had passed through there in 1690-1692, the chances of either trade or contact were rather remote.

Culture	*Time*	*Method of Dating*
Mortlach 1A	Later than 1780	Estimated
Mortlach 1B	1780 A.D.	Estimated
Moose Jaw 1A	1750 A.D.	Estimated Historic
Moose Jaw 1B	1700 A.D.	Estimated
Caron	1583 A.D.	Estimated Climatic
Besant 4A	1287 A.D.	Estimated Climatic
Besant 4B	375 A.D.	Carbon-14
Besant 4C	172 A.D.	Estimated Climatic
Besant 4D	36 A.D.	Estimated Climatic
Sandy Creek	445 B.C.	Carbon-14
Pelican Lake	800 B.C.	Estimated
Pelican Lake 5B and 6		?
Pelican Lake 7		?
Thunder Creek	1445 B.C.	Carbon-14

The author must apologize for drawing only a few comparisons between the cultural levels of the Mortlach site and those of northern United States, for these reasons: (1) The area is so new that it is probably better, for the time being at least, to let the reader draw his own conclusions. (2) Further excavations should be undertaken on key site locations in Saskatchewan of each of these various cultural levels before any widespread comparisons can be safely drawn with areas as remote as the central plains region.

IMPORTANCE OF THE SITE

As a pioneer work in Saskatchewan the excavation at Mortlach is of primary importance. As an archaeological site it is of major importance because of its well defined stratigraphy. As previously mentioned, it is a rare find that has as many levels of occupation and to have them cover such a wide time span is indeed fortunate. Stratified sites in the Plains area often mean buried soil profiles, but buried by the action of wind. All too often these levels show signs of reworking. The winnowing action of the wind often sorts the artifacts from several levels of occupation and drops them indiscriminately on a lower soil zone, or worse yet, on a false soil zone represented by the drifting of late soil containing carbonaceous material on top of a wind blown area. This type of stratigraphy can be very misleading.

In the Mortlach site it is to be noted that Mr. Moss, in his independent soils analysis, found evidence of dune (wind blown) sand only in one level of

occupation. The major levels of the site, those containing most of the major cultures, were deposited by water. Water as an agent of deposition can be almost as destructive as wind, as evidence by the zones 5B to 7. However, here the evidence of water disturbance is plain.

1. Uneven levels showing the action of water on the surface.
2. The lack of upper soil zones.
3. The washing away of most carbonaceous material.
4. Where carbon is present it is an obvious secondary deposit, speckled through the sand.

Contrast these conditions with those found in the well stratified deposits of the levels 5A to 3. This area is one where the stream did not take direct action during deposition. Silts and sands were deposited as slack water deposits on flooded valley flats. Here, (1) the levels are even and well defined and reflect the bedding planes of the levels below them upon which they were deposited; (2) upper soils ("A") zones are in evidence; (3) carbonaceous material is present in well defined layers and often associated with the fired stones representing the original fire which helped cause the deposit; (4) a well defined root system indicating old soil surfaces; (5) the cultural material associated with these levels showed a marked consistency throughout the level and often a marked difference from the culture above or below it. This type of stratigraphy is true stratigraphy and is shown in all of the established levels of occupation in the Mortlach site.

As far as Saskatchewan archaeology is concerned, the Mortlach site represents a calendar culture sequence that can be used as a guide for future excavations. As other sites are excavated gaps in the sequence will be filled until the whole jig-saw puzzle of Saskatchewan archaeology is fitted together. To archaeologists from other parts of Canada and United States, the Mortlach site offers an opportunity to compare material found at certain time levels in their area to material of a similar time level in Saskatchewan. Thus can be established the range of cultural complexes, and the distribution of cultural traits. The Mortlach site is not sufficiently represented culturally to allow solid conclusions regarding distribution to be drawn but at least it supplies clues—clues based on careful excavation and well defined stratigraphy.

THE POTENTIALITIES OF SASKATCHEWAN ARCHAEOLOGICALLY

Saskatchewan is a favoured province archaeologically. During the preliminary site survey of 1951, every type of early man projectile point represented in Canada and United States, with the exception of Sandia points, was found in Saskatchewan. Most of these points were to be found in the collections of amateur archaeologists who searched the windblown areas; but early man was here and further search will undoubtedly unearth sites belonging to the various people who used them. This search should be carried on year by year in the form of a site survey—accurate location of campsites of these early people; and photographs of the material collected by the amateurs, by location where possible. Tests should be made of these locations with a soils auger or post-hole auger, and an accurate log kept of the cultural levels found and their depths. Surface collection should be made wherever possible. The tests should be conducted first in the vicinity of the proposed Saskatchewan River dam—in the area that will be flooded by the building of this dam.

For several years now, Dr. W. O. Kupsch of the Department of Geology, University of Saskatchewan, and his students have been working on the glacial deposits of the province. These pleistocene deposits contain all of the archaeological material of the province. As this work progresses to the point where the overall picture represented by the last glaciation can be seen with accuracy, archaeological research can be conducted by methodically searching geologic features where living conditions were such as to encourage habitation during various time periods—features such as river and stream terraces, sand beaches and strand lines. These features can be correlated in time by the use of Carbon-14. Buried soils found on terraces, etc., can be dated by this method. This will mean that the most likely camp locations for the various early cultures can be plotted with some degree of accuracy before the archaeologist ever sets foot in the field.

Another important field of exploration is the historic approach to the archaeological field. Well authenticated Indian encampments, which were associated with early forts or camps established as those of known tribes by historic reference, should be given careful consideration. Tests should be made at these locations, and the better locations excavated by a competent archaeologist. This will establish the material culture associated with existing tribes at the time of the historic reference. The results are obvious—the plotting of distribution of known tribes, and the establishment of the ancestors of historic tribes and their distribution.

If the preliminary survey is carried out quite extensively, duplication of material derived from major excavation can be avoided. A handful of carefully chosen sites can give as complete a story as a dozen chosen at random.

In brief, future archaeological work in Saskatchewan should be undertaken in chronological fashion: (1) exploration of the province, directed where possible by the results of geologic and historic research; (2) test excavation to establish the archaeological sites most likely to produce the best cultural picture for the least expense; (3) major excavations conducted on these "key" sites.

Mortlach has shown us a skeleton of cultures. Now it is up to future archaeological research to supply more flesh and clothing for the bones. This research should include: (1) a more complete cross-section of material culture of the levels found in the Mortlach site; (2) filling in new cultures lying between these levels in time; (3) establishing more fully the life of the people of each of these levels of occupation—their house types, pets if any, burial practices, trade relationships, migrations, and their neighbours. These and other elements of living are written into the pages of the archaeological sites of the province—many of these as yet unknown and undisturbed. Only careful planning and extremely careful excavation can interpret these pages of archaeological history and change them to written pages of the history of the early inhabitants of Saskatchewan.

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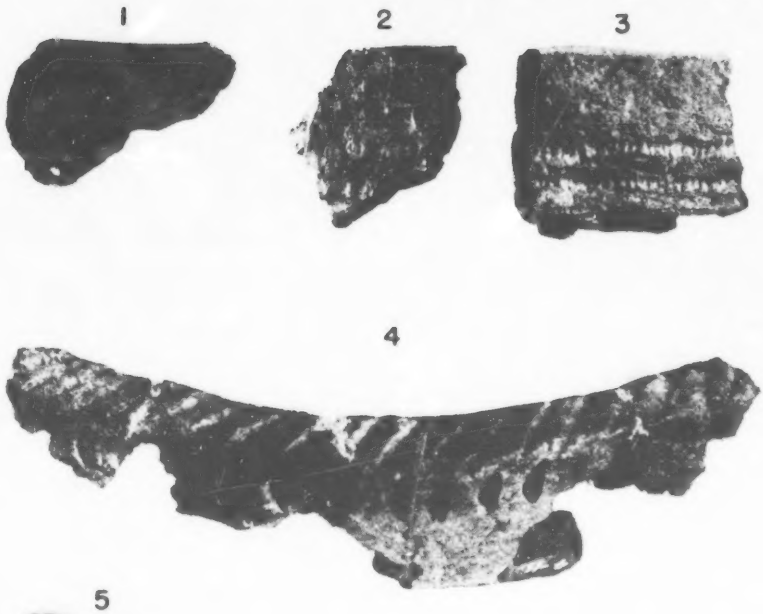
PLATE 1

1. Mortlach Check-Stamped—Varient
2. Mortlach Check-Stamped—Body Sherd
3. Cord Marked Pottery—Rim
4. Mortlach Check-Stamped—Rim
5. Cord Marked Pottery
6. Bone Bead
7. Projectile Point—Plains Side Notched
8. Projectile Point—Prairie Side Notched
9. Hoe-like Scraper
10. Hammer Stone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1/2 SIZE

PLATE 2

1. Moose Jaw Cord-Marked—Rim
2. Moose Jaw Cord-Marked—Rim
3. Moose Jaw Cord-Marked—Rim
4. Cord-Marked—Rolled Rim
5. Pottery Plain Rim
6. Sand-Tempered Pottery
7. Sand-Tempered Pottery
8. Metal Scraper—Gun Barrel
9. Cord-Marked—Sinew Impressed
10. Psuedo—Basketry Design

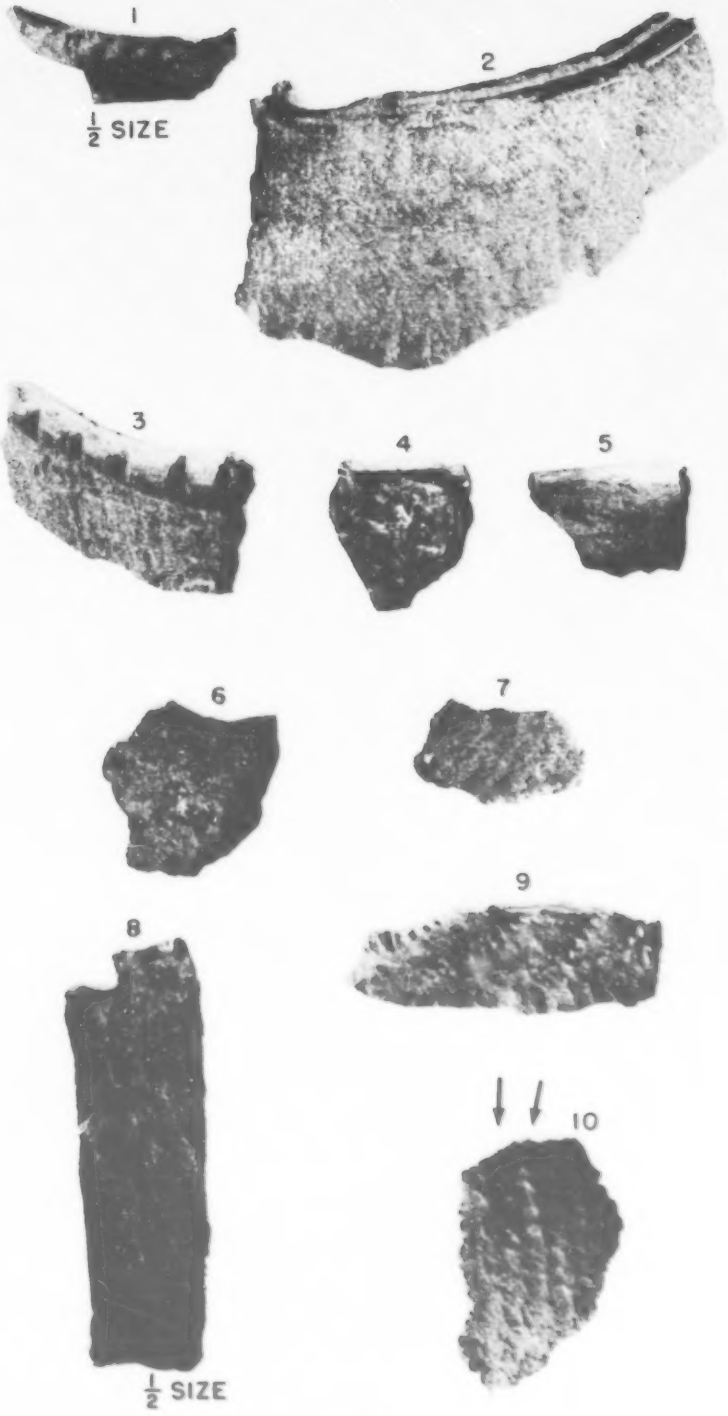
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PLATE 3

1. Fragment of Stone Pipe
2. Scraper—Plano-convex
3. Scraper—Flat-end.
4. Projectile Point—Plains Triangular
5. Projectile Point—Prairie Side Notched
6. Scraper—Plano-convex
7. Projectile Point—Eared
8. Projectile Point—Tapered Base Side Notched
9. Projectile Point—Corner Notched
10. Blade—Notched
11. Blade—Ovoid—Second Level
12. Scraper—Flat-end
13. Scraper—Flake
14. Blade—Ovoid—First Level
15. Chopper with Pottery Clay Adhering to It
16. Blade—Crude
17. Blade—Crude
18. Stone Plate or Grinding Stone

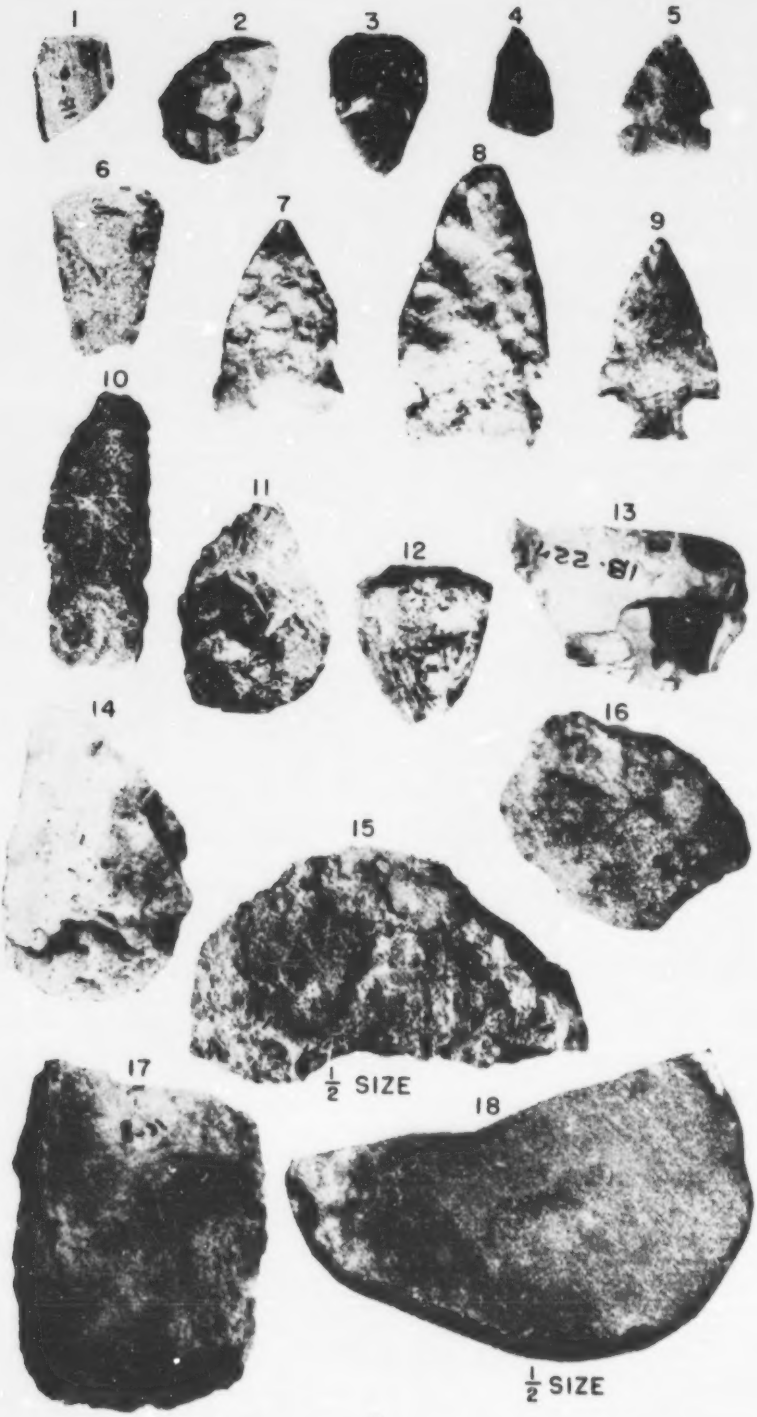
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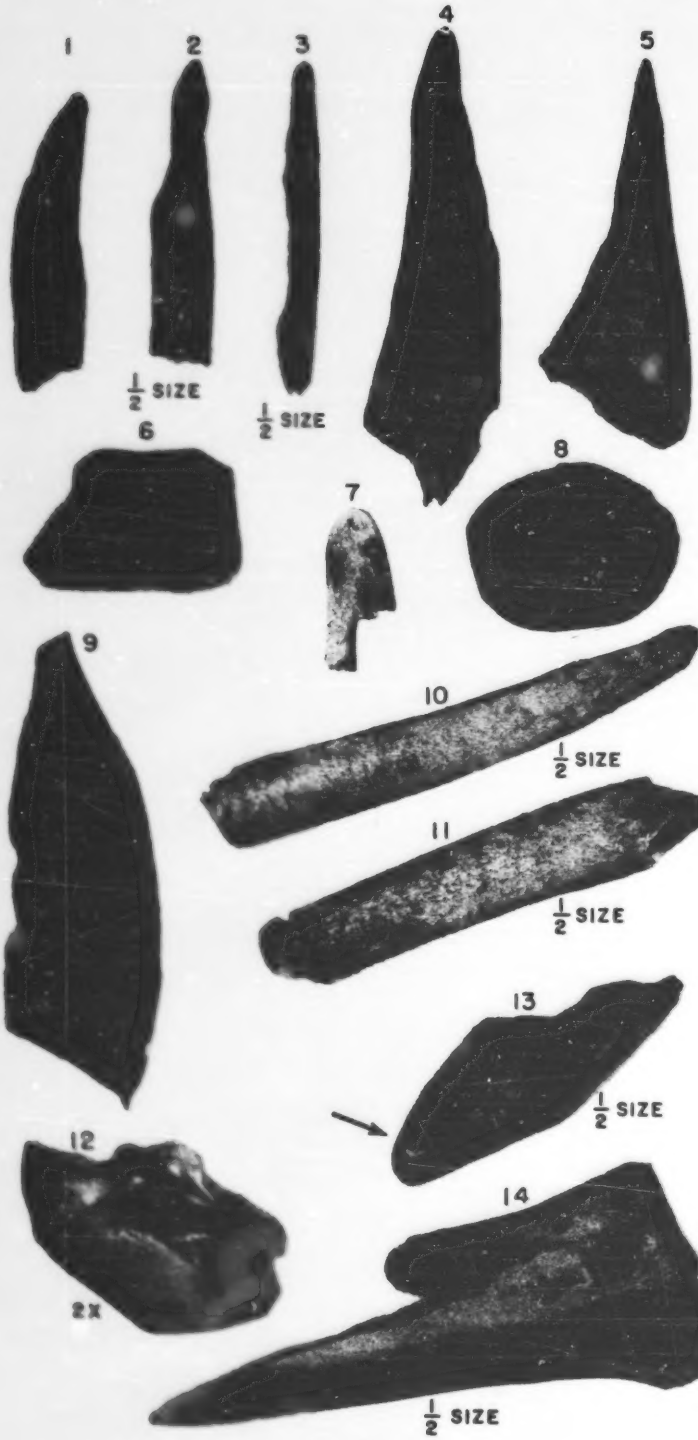
PLATE 4

1. Splinter Awl
2. Bone Flaker
3. Bone Flaker
4. Bone Scraper Type 3
5. Splinter Awl
6. Bone Gaming Piece
7. Tip of Bone Flaker
8. Bone Gaming Piece
9. Rubbed Bone Fragment
10. Bone Scraper Handle—Snow Dart
11. Bone Partley Shaped for Snow Dart
12. Worked Shell
13. Bone Scraper Type 2
14. Bone Flesher Type 1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½ SIZE
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12
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14
½ SIZE

PLATE 5

1. Projectile Point—Eared
2. Projectile Point—Straight Based
3. Scraper—Plano-cancave
4. Scraper—Plano-convex
5. Scraper—Plano-cancave
6. Scraper—Plano-convex
7. Projectile Point
8. Scraper—Flake
9. Scraper—Curved or Spokeshave
10. Blade—Ovoid
11. Blade—Trade
12. Scraper—Bone—Curved
13. Bone—Worked Splinter
14. Blade—Ovoid
15. Hammerstone

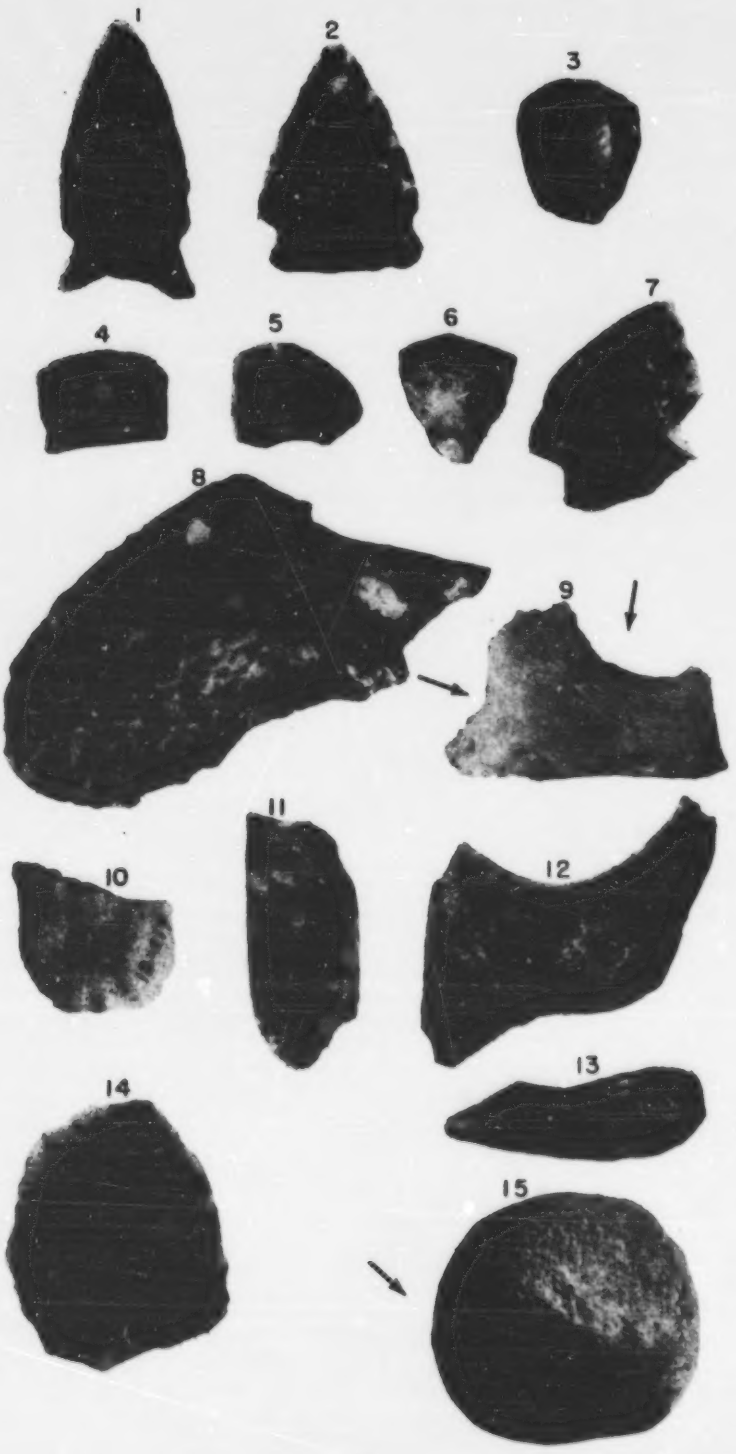
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PLATE 6

1. Projectile Point—Pelican Lake Type
2. Projectile Point—Besant Culture
3. Projectile Point—Besant Culture
4. Projectile Point—Besant Culture
5. Scraper—Plano-convex
6. Scraper—Flat-end
7. Blade
8. Bone from which Beads have been Cut.
9. Bone Pendant
10. Scraper—Flake
11. Drill—Broken
12. Chopper
13. Blade Ovoid

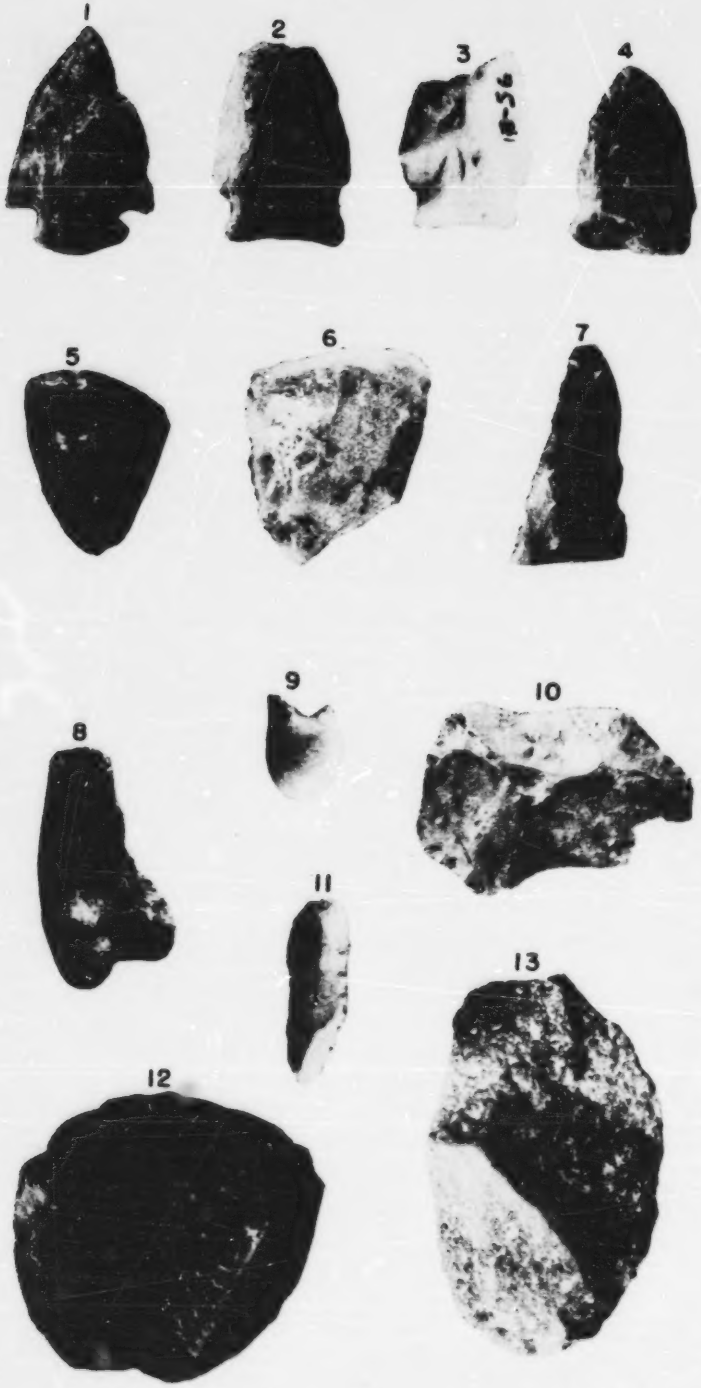
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PLATE 7

1. Projectile Point—Besant Side Notched
2. Projectile Point—Besant Side Notched
3. Projectile Point—Besant Side Notched
4. Blade—Besant Culture 4B
5. Scraper—Plano-convex
6. Projectile Point—Unnotched
7. Scraper—Flat-end
8. Scraper—Flake
9. Scraper—Curved—"Chisel"
10. Blade—Ovoid
11. Bone—Scored or Marked
12. Blade—Semi-lunar
13. Hammerstone

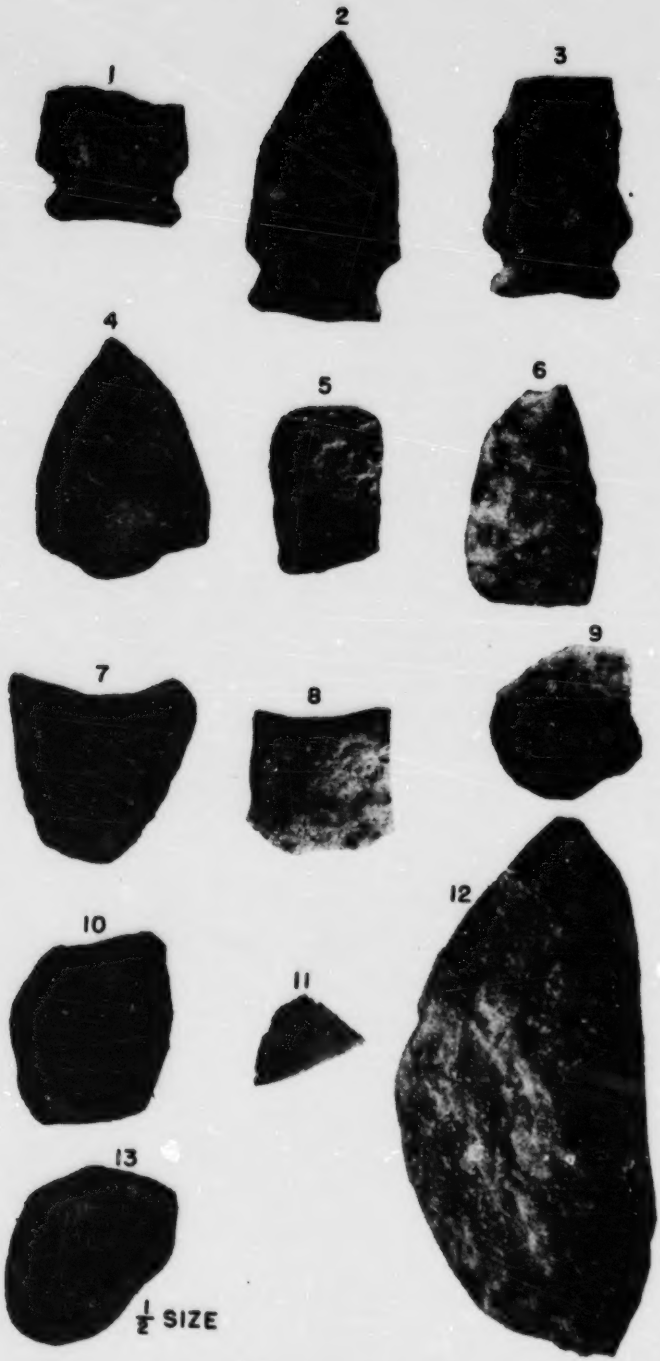
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PLATE 8

1. Projectile Point—Corner Notched
2. Scraper—Plano-convex
3. Scraper—Plano-convex—Obsidian
4. Tip from Projectile Point
5. Blade—Crude
6. Blade—Crude
7. Blade—Crude—Ovoid

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PLATE 9

1. Projectile Point—Indented Base
2. Projectile Point—Indented Base
3. Projectile Point
4. Scraper—Flat-end
5. Projectile Point—Broken—Diagonal Flakes
6. Scraper—Flat-end
7. Scraper—Curved "Chisel"
8. Scraper—Flake
9. Scraper—Plano-convex
10. Blade—Square Based
11. Scraper—Flake
12. Blade—Square Based
13. Blade—Ovoid Crude
14. Blade—Ovoid

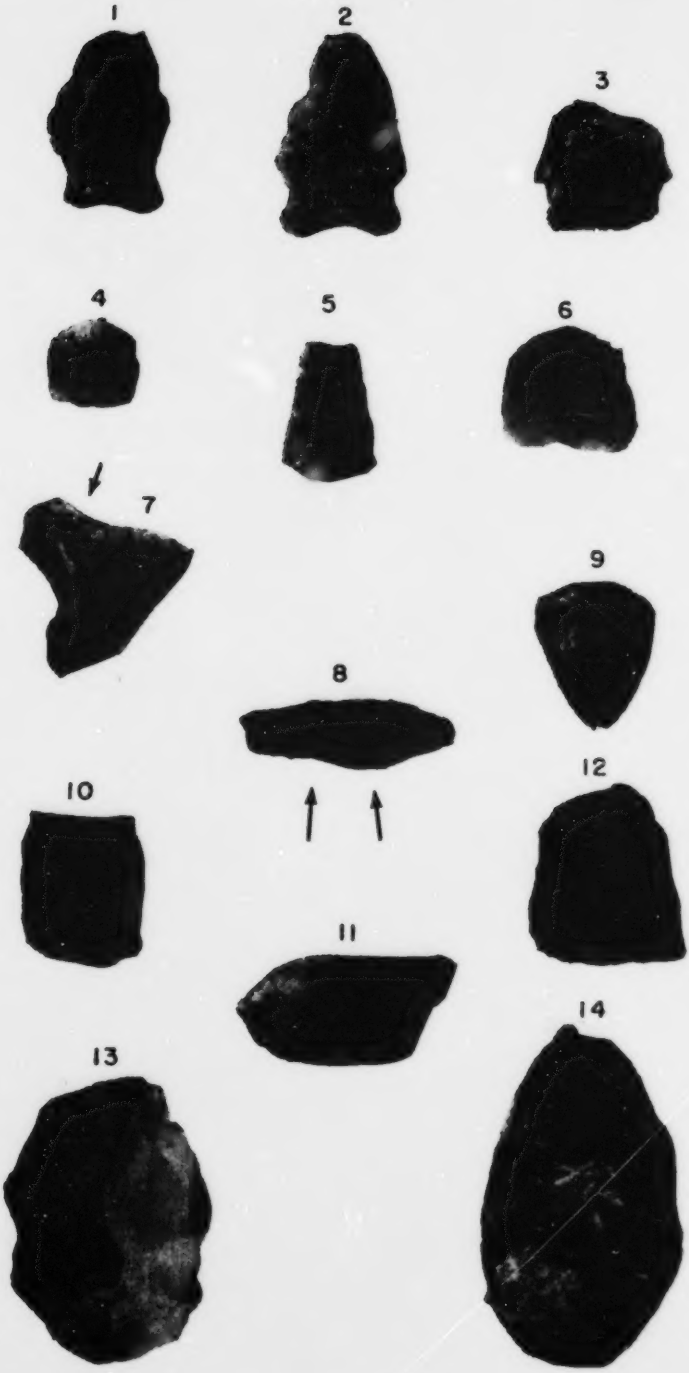
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PLATE 10

1. Projectile Point—Sandy Creek Type
2. Projectile Point—Sandy Creek Type
3. Scraper—Domed
4. Blade—Ovoid
5. Scraper—Flat-end
6. Scraper—Flake
7. Scraper—Flake
8. Scraper—Flake
9. Scraper—Curved "Chisel"
10. Scraper—Curved "Chisel"
11. Blade—Ovoid
12. Blade—Ovoid
13. Scraper—Large
14. Chopper—Crude
15. Bone Spatulate Tool
16. Bone Tool—Use Unknown
17. Blade—Crude—Semi-lunar
18. Bone Sewing Awl
19. Bone Scraper
20. Bone Scraper—Flaked

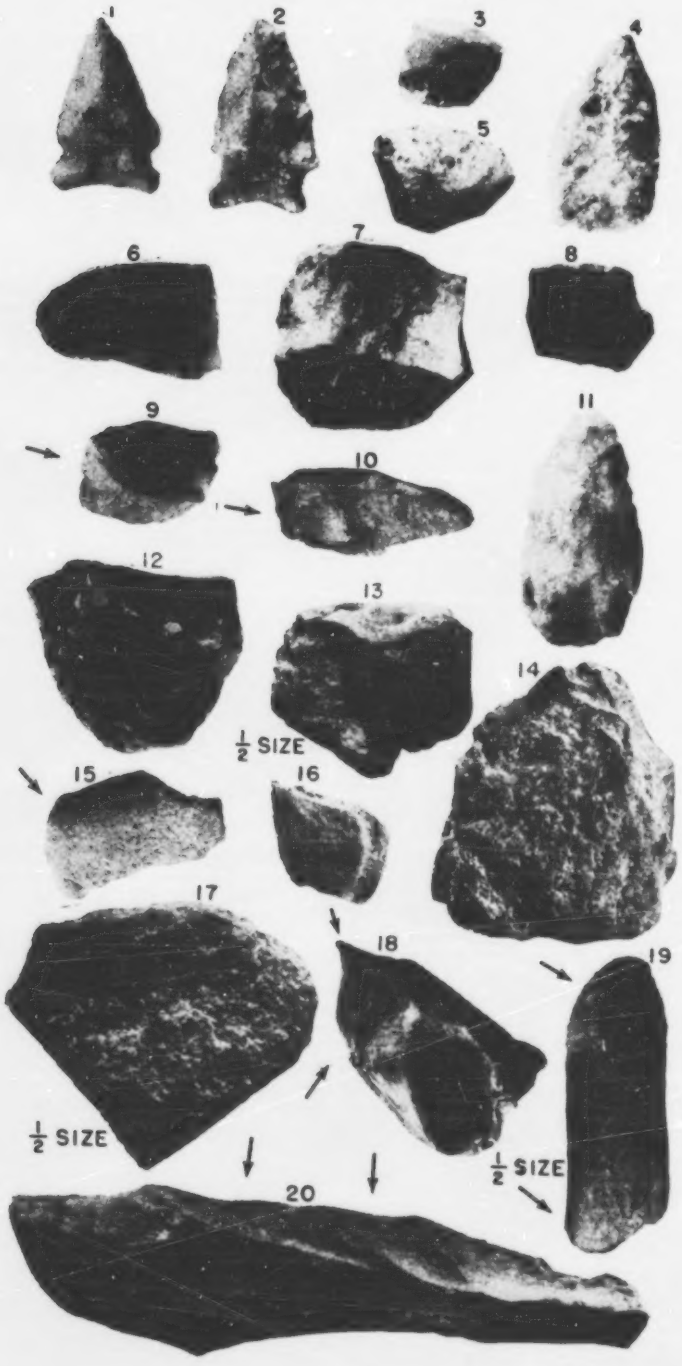
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PLATE 11

1. Projectile Point—Pelican Lake—[illegible]gonal Flaking
2. Projectile Point—Pelican Lake
3. Projectile Point—Pelican Lake—Diagonal Flaking
4. Projectile Point—Pelican Lake—Small
5. Projectile Point—Pelican Lake—Small
6. Projectile Point—Pelican Lake—Small
7. Scraper—Curved "Chisel"
8. Scraper—Flake
9. Scraper—Curved "Chisel"
10. Scraper—Curved "Chisel"
11. Blade
12. Blade

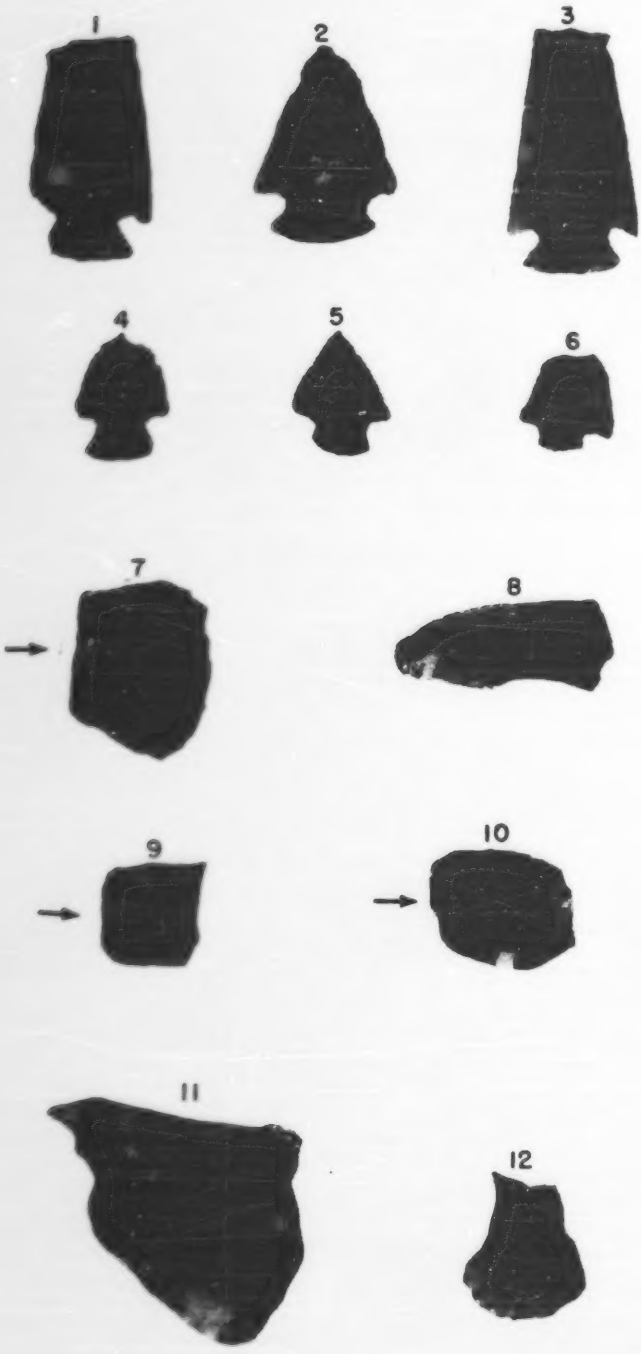
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PLATE 12

1. Projectile Point—7—Diagonal Flaking
2. Projectile Point—5B and 6—Diagonal Flaking
3. Scraper—Flat-end—7
4. Scraper—Domed—7
5. Scraper—Domed—7
6. Scraper—Domed—7
7. Blade—Red Patina—7
8. Scraper—Flake—7
9. Blade—7
10. Scraper—Flake—5B and 6
11. Bone—Showing Root Markings—5B and 6
12. Bone Flake—7
13. Scraper—Bone—7
14. Scraper—Concave—5B and 6

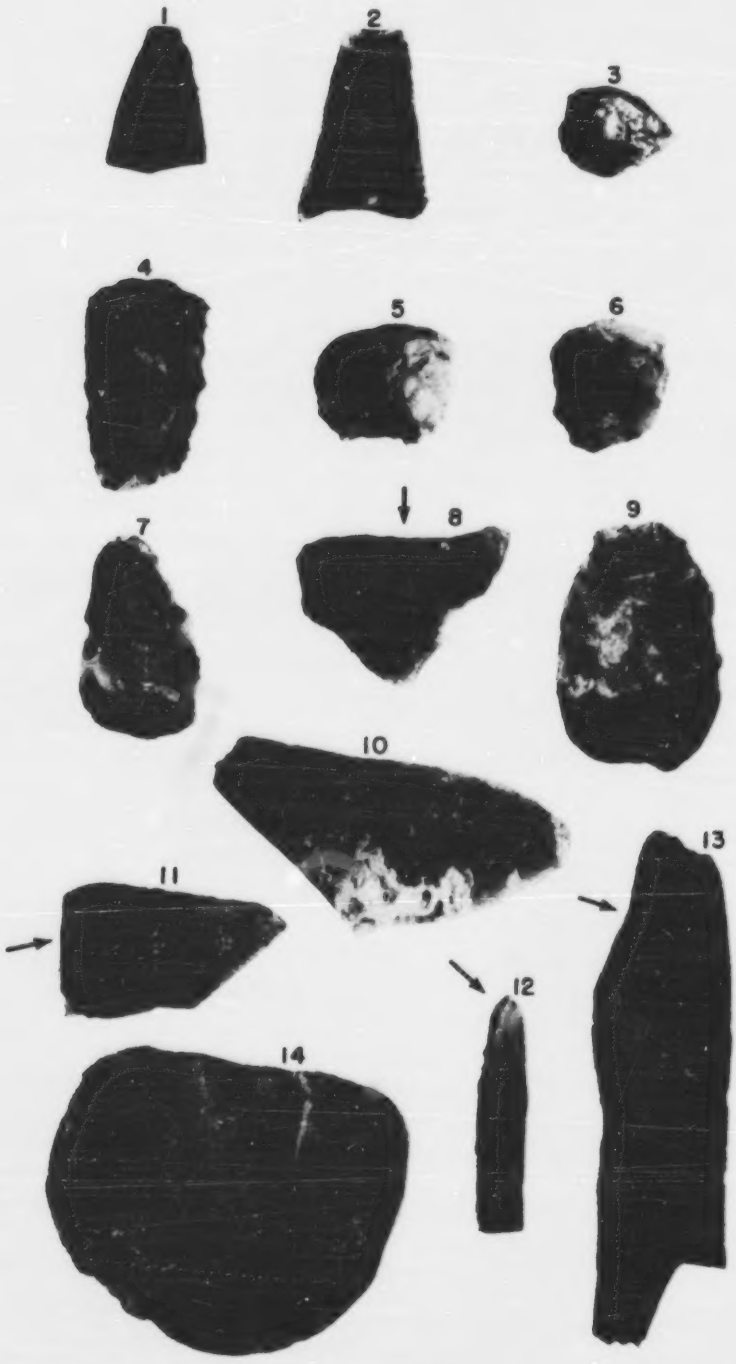
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PLATE 13

1. Thunder Creek Projectile Point
2. Blade—Ovoid
3. Thunder Creek Projectile Point
4. Scraper—Flat-end
5. Blade—Ovoid Crude
6. Blade Fragment
7. Crude Chopper
8. Crude Chopper

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½ SIZE

PLATE 14

1. Scraper—Flat-end
2. ProjectilePoint—Concave Base—Stemmed
3. Projectile Point—Concave Base
4. Scraper—Domed
5. Scraper—Flake
6. Scraper—"Chisel"
7. Blade—Squared
8. Blade—Ovoid
9. Scraper—Flake
10. Scraper—Pebble Arrow Indicates Wear
11. Scraper—Pebble Arrow Indicates Wear

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